THE ENGINEERING AND MINING JOURNAL

Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXV. No. 15.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF Jr. M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

SUBSCRIPTION PRICE, including postage, for the United States and Canada, $4 per annum ; $2.25 for six months ; all other countries, including postage, $5.00 = 20s. = 25 francs = 20 marks. All payments must be made in advance. Parties accepting any other than our official receipt for subscriptions, from agents, do so at their own risk.

Advertising Rates.—See page xvii.

Mr. C. A. Green is our accredited representative for New York.

Mr. A. R. Brown, Jr., is our accredited representative for Boston and the Eastern States. Office, Room 1, Simmons Building, 40 Water street, Boston.

Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Philadelphia.

Mr. A. H. Taylor, 159 Lake street, Chicago, is our accredited representative for Chicago and the Northwest.

Mr. O. D. Cotton, Room 36, Wiggins Block, Cincinnati, O., is our accredited representative for Cincinnati, O., Louisville, Ky., and vicinity.

Mr. O. J. Frost, care Boston & Colorado Smelting Company, Argo, Colo., is our accredited representative for Denver and vicinity.

REMITTANCES should always be made by Post-Office Orders or Bank Drafts on New York, made payable to THE SCIENTIFIC PUBLISHING COMPANY.

THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager.
P.O. Box 1833. 27 Park Place, New York.

CONTENTS.

EDITORIALS:	PAGE.
The Meeting of the American Institute of Mining Engineers at Roanoke, Va	203
Congressional Stupidity	203
Mr. C. M. Rolker	203
Spain as a Mineral-Producing Country	203
Prof. L. Gruner	203
The Transmission of Power by Electricity	203
CORRESPONDENCE:	
The Working of the Nichols Furnace	204
The New York Metal Exchange and the *Iron Age*	204
Official Statements and Reports	204
Coal Used in the Manufactures of the United States	205
Electrical Transmission of Power in Mines	206
Concentrating Ores in Southwest Missouri	207
Coal Mining in Great Britain in 1882	207
The Origin of Crystalline Iron Ores	207
The Morey Pulverizer for Wet Crushing	209
The Coke Industry	209
The Deposition of Gold by Charcoal	210
The Law as Affecting Mining and Metallurgical Interests	210
Furnace, Mill, and Factory	210
NOTES:	
The Coinage of Silver at the Mexican Mints	204
Number of Cities in the World Possessing Telephones	206
A New Coal-Cutter	209
The Pulsometer in Germany	210
GENERAL MINING NEWS:	
Arizona	210
California	210
Canada	211
Colorado	211
Dakota	212
Idaho	212
Maine	212
Michigan	212
Montana	212
Nevada	212
Utah	212
FINANCIAL:	
Gold and Silver Stocks	213
Copper Stocks	213
METALS	214
BULLION MARKET	214
IRON MARKET REVIEW	214
COAL TRADE REVIEW	216
Advertisers' Index	x

THE next meeting of the American Institute of Mining Engineers will be held at Roanoke, Va., during the first week in June.

GEN. S. V. BENÉT, Chief of Ordnance, announces that, as Congress has failed to appropriate money, he can not pay the freight charges on material sent for testing to the Watertown Arsenal.

MR. C. M. ROLKER will leave for the West about the beginning of May, to examine some mining properties. Those desiring to communicate with him should address him at No. 63 Broadway until May 5th, and care of Messrs. HAGEN & BILLING, No. 1 Wall street, after that date.

SPAIN appears to be forging ahead as a great mineral-producing country. The exports of the years 1881 and 1882 were, according to recent statistics, as follows, the unit being the metric ton :

	1881.	1882.
Metallic copper	17,710	22,708
Quicksilver	1,779	1,067
Iron	37,903	40,115
Lead	105,809	116,132
Zinc ore	30,604	25,832
Copper ore (presumably pyrites)	452,475	571,442
Iron ore	3,137,083	4,021,761

The increase in copper and pyrites, in pig-lead, and in iron ore is striking ; while on the other hand, the falling off in the export of quicksilver is very great.

PROF. L. GRUNER, of the Paris School of Mines, the great French mining engineer and metallurgist, died last month. He suffered a few years ago from a severe attack of sickness, and had since then, though he partially recovered, been able to do comparatively little work. He was one of the honorary members of the American Institute of Mining Engineers, in whose progress and prosperity he took a great interest.

THE TRANSMISSION OF POWER BY ELECTRICITY.

There has been a great deal of misapprehension and error in regard to the transmission of power by electricity, and earlier experiments, notably those made at Munich, have failed to furnish data of value. The results of a series of tests, carried on with great accuracy by M. TRESCA and Dr. HOPKINSON at Paris, and now published, will, therefore, be welcomed, as furnishing indications where the principal losses of power are to be sought, and how far they may be avoided. To those engaged in mining and metallurgy, they are particularly interesting, because the special circumstances under which operations in those industries are carried out are such as to open a wide field for usefulness. We print elsewhere the records of two instances where the electrical transmission of power was employed in French mines, and shall in the future add others relating to Austrian and German mines.

The Paris experiments, at which a plant put up by M. MARCEL DESPREZ was used, consisted of two machines, the generator and the motor, placed side by side, but connected with a four millimeter or No. 9 Birmingham gauge telegraph wire, carried to Bourget, a suburb of Paris, and back again, a distant of 10½ miles ; but as the two poles of the machines were connected by a short conductor, the conditions were the same as though the power had been transmitted a distance of 5½ miles.

During the first series of experiments, the average of six trials showed that of 6·21 horse-power developed at the dynamometer, the generator, the producer of the electric current, running at a speed ranging from 571 to 633 revolutions, developed an electric power at its terminals of 4·43 horse-power. The power consumed in the transmission of the current through the wire to the motor was 1·31 horse-power, leaving the electric wire in horse-powers at the terminals of the motor 3·12, the motor running at a speed varying between 315 and 418 revolutions. The loss at the motor was 1·09 horse-power, and only 2·03 horse-power were transmitted to the brake, thus showing the efficiency of the entire plant to be only 32·6 per cent.

In these experiments, it was therefore shown that the efficiency of the three parts of the plant, the generator, the conductor, and the motor, was closely 70 per cent for each, and that approximately one third of the power applied to the generator may, under the conditions of the plant used, be made applicable to the driving of machinery at a distance of 5½ miles.

A second series of experiments was conducted with the same plant, but so modified as to drive the generator with greater speed, ranging between 705 and 883 revolutions per minute. On an average of four trials, the motive power measured at the dynamometer was 10·389 horse-power, of which 8·193 horse-power was actually transmitted to the generator, which consumed 1·493 horse-power, leaving 6·799 horse-power, which, by the conversion of electricity into heat during the passage of the current from the generator, through the wire transmission to the motor, was reduced by 1·373 horse-power. Out of the 5·426 horse-power left, 2·123 horse-power was consumed by the resistance of the motor, thus carrying down the power transmitted to the brake to 3·304 horse-power, equal to an efficiency of 31·9 per cent, or 40·3 of the power communicated to the spindle of the generator. The loss of power in the generator and the motor can be only partly traced to its source. In the second series, where, by the way, these losses were relatively heavier, it has been computed that the electrical power consumed by the conversion of electricity into heat was 0·549 horse-power in the generator and 0·814 horse-power in the motor, leaving a loss of 0·844 and 1·309 horse-power respectively as a supplementary loss of work, which is due to a variety of causes, and which careful study of the conditions will probably reduce.

The efficiency of a plant for the transmission of power may be considerably increased also by the use of conductors offering less resistance and well isolated. By generating electricity of high tension, the thickness of the conductor and its cost may be reduced ; but, on the other hand, this expedient has its drawbacks that may counteract its advantages.

From the data at present available, it appears that the best economy is to bestow much attention and invest a greater outlay in the construction of the conductors.

The possibilities of the use of the transmission of power by electricity are undoubtedly great, and there are many localities where the utilization of a head of water above or below ground will prove valuable, even though the loss and the investment of capital may be great. It may be expected to compete successfully with compressed air, wire-rope transmission, or water under pressure.

It may be of interest to call attention to the fact that the Mansfeld Copper Mining Company, of Germany, has recently offered a prize of 5000 marks, or about $1200, for the best design of a plant to transmit power under ground to a considerable distance, 1700 to 3200 feet or more.

The conditions are, that the power available shall not be less than ten-horse; and it is left to the designer to employ a motor below ground, or to transmit the power from the surface, upon the condition that the rotating parts of the transmission shall not have a speed exceeding 100 revolutions, the cost not to exceed the use of steam-power. It is probable that a very interesting series of designs, bringing out the relative points of the various methods of transmitting power, will be offered, there being no restrictions as to the method chosen, and we trust that the leading representative designs will be published.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Working of the Nichols Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We notice in your last week's issue a description of the furnace in use at our works, in which some figures are given of different days' runs. We should like you to mention, in explanation of the apparent burden carried by the coke, that the latter, besides being of very ordinary quality (gas-coke), contained about fourteen per cent of moisture, having been exposed in our yard for a long time. It was also very dirty. In the runs given of the 48-inch and 36 by 66-inch furnaces, there is no mention made of old slag also used in the charges. These explanations make a better showing for the work of the furnace than is apparent on the figures presented by you last week. Yours truly, G. H. NICHOLS & CO.

NEW YORK, April 10.

The New York Metal Exchange and the "Iron Age."

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: A very spirited article in the *Iron Age* of April 5th announces that they have at last waked up at 83 Reade street, and are making a praiseworthy effort to find out how much they are behind the times. Their ideal of a metal trade seems to be some half a dozen merchants who shall act as local agents of the manufacturers by buying contracts of metal and peddling it out in retail lots in faithful adherence to the quotations in the *Iron Age*. This plan might work to advantage if this valuable organ was only published in Oshkosh or in Skowhegan; but the New York market, unfortunately, long since gave up in any way regarding the prices that the *Iron Age* solemnly sends forth once a week, with a calm disregard of intermediate fluctuations. The paper still keeps up an air of benevolent patronage of the trade; and when, a year ago, the movement to start an Exchange began, there was quite a scare in Mr. Williams's office at the idea that the "organ of the metal trades" was to be robbed of the controlling influence that it still fondly believed it exercised. When the split came that resulted in the formation of two Exchanges, confidence was restored, and after a most courteous treatment of both sides, the *Iron Age* ignored the existence of both, and went on quietly in its old way, sure that the two Exchanges would destroy each other, and that there was no necessity for enterprise or a remodeling of the methods that this venerable journal has pursued for a quarter of a century.

And now comes another rude shock. All the differences between Pearl street and Wall street having been satisfactorily adjusted, a plan of consolidation is agreed on, and the *Iron Age* finds itself confronted afresh with the necessity to adapt itself to the changed conditions that have been developed since it really was a power, and to make some effort to progress with the expansion of the metal trade consequent on the enormous growth of New York's commerce. It finds all its predictions disproved and its most cherished prejudices disturbed. The effort is too great, and the usual refuge of the inveterate conservative is sought in denial of every thing that is before it. The editor loses none of his genial politeness in his editorial, but in his most suave manner announces—as I heard suggested to-day—"that here are four hundred fools, and he alone the wise man" of the metal trade. He complains most pathetically that the prices at Pearl street have not always agreed with his quotations; but surely it was a little unreasonable to expect them to. He tells us, in his knowing way, that all four hundred of us are very much dissatisfied with our experiment of one year, and do not want to try it for another. We do not agree with him, and are proving it by proceeding to try; but possibly we are all wrong, and he is right. The arguments that he uses we remember faintly to have heard a year ago, and as they have not been proved by experience, we see no reason why this new strong organization should not be of as great service to our trade as other exchanges have been to other lines of business in the facilitating of transactions, the authoritative settlement of disputed points, and the drawing to New York, as the definite center of the metal trade of America, of much business that is now scattered to other points.

If we disturb the rooted traditions of Reade street, it is sad but unavoidable; and the *Iron Age* should remember that progress and growth are very apt to be uncomfortable for somebody. Yours truly,

NEW YORK, April 5, 1883. EDWARD J. SHRIVER.

THE COINAGE OF SILVER AT THE MEXICAN MINTS.—In the fiscal year 1880–1881, the following were the amounts of silver coined at the Mexican mints, according to *La Libertad*:

Zacatecas	$5,977,000
Mexico	5,691,000
Guanajuto	4,135,250
San Luis Potosí	2,315,750
Guadalajara	1,363,241
Culiacan	1,219,083
Chihuahua	1,178,534
Durango	977,964
Alamos	905,663
Hermosillo	711,250
Oaxaca	142,660
Total	$24,617,395

OFFICIAL STATEMENTS AND REPORTS.

THE HORN-SILVER MINING COMPANY, FRISCO, UTAH.

The second annual report of this company has been issued, and contains many facts that are interesting, not only to the stockholders of the company, but also to the mining public in general. The Horn-Silver is the greatest single producer of lead, and, with the exception of the Richmond Company, of Nevada, is the only one which mines, smelts, and desilverizes. The figures submitted are exceptionally full and complete, and therefore make the Horn-Silver report a document which will be studied with profit, particularly those parts relating to smelting and refining.

In extracting 47,232 tons of ore, and driving 1808 feet of levels and cross-cuts, 121 feet of uprise, and sinking shafts 472 feet, the following amount of labor was done:

	Days' work.
Surface engineers	1,118¾
Firemen	646½
Blacksmiths	436¼
Carpenters	1,149¾
Timber-men	647
Car-men	1,536
Laborers	9,082¾
Watchmen	58
Miners on ore	17,048¾
Miners' dead-work	4,301
Total	36,024¾

In the distribution of the dead-work in the different levels, there has evidently been some error. We find the sixth level credited on the one hand with 19 days' labor for dead-work, while elsewhere we are informed that it has been extended 210 feet. In the main shaft, 172 feet were sunk with 605 days' work; and in No. 4, 300 feet, with only 318 days' work.

The supplies used stand as follows:

Coal	140,000 pounds.
Wood	863 cords.
Candles	713 boxes.
Powder	703 kegs.
Fuse	54,500 feet.
Timber	1,233,062 feet.
Illuminating oil	464½ gallons.
Lubricating oil	126 "

The total cost of mining 47,232 tons was $209,535.08, or say $4.44 per ton. The various parts from which the supplies of ore were drawn are shown in the following table:

	Net tons of ore.	Average assay. Lead, p. c.	Silver, ounces.
First level	2,533·85	36·8	52·8
Second level	23,344·34	37·0	31·5
Third level	18,788·52	38·9	36·3
Fifth level	115·42	34·2	15·8
Total	44,782·13	37·8	34·2

The bulk of this ore, 41,808·90 tons, went to the Francklyn smelter; but as a certain amount was also smelted at the Frisco smelter, it is not possible, from the data given, to present a full account of the quantity of materials used and the cost.

Mr. A. Raht, the superintendent, gives the following statement of the materials consumed, we presume by both smelters, in 1882:

	Tons.
Ore	42,748
Limestone	20,657
Iron ore	9,652
Morgan slag	3,754
Coke	15,679
Charcoal	534
Stone coal	1,708
Frisco matte	613
Scrap-iron	114

The product was 14,329·8 tons of bullion, carrying on an average 100·4 ounces of silver, the loss being 9·71 per cent of lead and 2·10 per cent of silver. Closer work, it is stated, would unduly increase the cost. It will be noted that the quantity of limestone used was very high. Mr. Raht speaks very well of the steel jackets which he uses now in his Francklyn furnaces. He places the average cost of smelting at Francklyn at $14.73 and at Frisco at $29.41. From the financial statement, we take the following, giving an itemized account of the expenditures at the two works:

	Frisco. (5176 tons.)	Francklyn. (43,374 tons.)
Labor, supplies, and expenses	$33,228.36	$166,892.23
Iron ore	45,081.92	86,032.43
Limestone	721.59	33,252.15
Charcoal	30,243.24	11,184.09
Coke	32,329.44	323,953.41
Wood	6,990.50	.....
Coal	.....	9,738.66
General expenses	3,600.00	4,800.00
	$152,195.05	$635,852.97

Assuming that the ore was very nearly the same in character, it will be seen that the cost of flux at Frisco, where iron ore was almost exclusively used, was $8.85 per ton; while at Francklyn, where a large proportion of limestone was substituted therefor, it was $2.75. We are not sufficiently familiar with the sources of the supply of iron ore and limestone at the two smelters to judge how much of this large saving is due to differences in cost of transportation; nor is it possible, in the absence of data, to determine how largely the great difference in the cost of smelting at Frisco and at Francklyn is counterbalanced by the cost of shipping the ore farther. We find only this item: "Freight on bullion and ores to Salt Lake, $287,168.70." Mr. Harry C. Hill, general manager, states that the Utah Central Railroad reduced the freight charges on ore to the smelter one dollar per ton; but no reduction seems to have been made on coke, fluxes, or bullion. It is expected, however, that the completion of the Denver & Rio Grande Railroad to Salt Lake will in some measure relieve the company from the high rates paid.

According to reports by Mr. Frederick Honkamp, of the Chicago refinery, 16,082 tons of bullion were treated at a cost of $9.05 per ton. This cost, which is low, considering the fact that the plant, as we understand, is not equal to more modern works, is not itemized. The only

figures showing how it is distributed are the following: Fuel, $42,981.39; labor, $61,640.93; and expenses, $40,782.81; total, $145,405.13. Last year, we found occasion to doubt the correctness of the allowance for loss on lead, 7½ per cent. This year, Mr. Honkamp, we are pleased to see, has carefully estimated the actual amount of lead in drosses, etc., and with their aid shows that his loss was 4·915 per cent, which, taking into account the loss still to be incurred in working these intermediate products, would carry it to nearly 5 per cent, which is the usual allowance to desilverizers. So far as silver is concerned, his statement is less clear. He has carefully estimated the quantity of silver on hand in bullion, skimmings, drossbars, and test bullion, which items also appear in the lead statement; but has apparently made up his deficiency of silver by putting down 21,803·65 ounces of silver as "in furnaces, process of refining, and drosses." Even if all of this silver should represent the loss, it would be low, being little more than one ounce per ton of bullion. It is an extremely difficult matter for the manager of a desilverizing works, without stopping the establishment and overhauling every furnace and every stock-pile, to make a close estimate of his silver on hand; and in the aggregate the small quantities discovered by a close search are generally larger than are expected. Still we doubt whether all of the silver thus carried as an asset will in reality be recovered. We have gone into this question, not with the object of criticising Mr. Honkamp's work, which is shown by the figures to have been excellently carried through, but because it is of interest to arrive approximately at the loss in silver in an American desilverizing works. The usual allowances are five ounces per ton, while in some foreign works, we believe, often a small excess over the assay is recovered.

The lead sales of the Chicago refinery were 29,135,597 pounds, which sold at an average of 4·55 cents—we presume at Chicago. The net receipts were $1,326,664.23. The silver sales yielded $2,010,125.77; the ore sales, $32,879.87; and the bullion sales, $443.77; making, with interest on call loans, $3,385,811.68. The disbursements were:

Mining	$269,805.08
Smelting	788,048.02
Freight on ore and bullion to Salt Lake	287,168.70
General expenses	13,565.60
Exchange	5,591.75
Bullion purchased	454.88
Freight on bullion to Chicago and New York	328,944.41
Refinery	145,405.13
New York office	21,247.35
Call loans, etc	536,194.61
Construction	32,313.71
Supplies on hand	64,620.15
Utah Central	1,744.57
Dividends	1,200,000.00
Cash	44,902.82
Total	$3,680,007.08

The assets, including supplies, call loans, cash and ore, bullion, silver, and lead in course of treatment, aggregate $1,137,297.29, while there are no liabilities.

THE SIERRA GRANDE MINING COMPANY, LAKE VALLEY, NEW MEXICO.

The directors of this famous mine have submitted to the stockholders a brief financial statement, dated March 16th, from which we extract the following notes on the receipts and expenditures of the company from July 20th, 1881, to that date:

The Sierra Grande sold silver bars to the extent of $1,048,436.59 and ores netting $37,266.52, which, together with $10,000, a working capital subscribed to begin development, carries the total receipts to $1,095,703.11. In the payments we note $31,000 for additional mining property, and the heavy sum of $173,518.92 for construction account. The twenty-stamp mill cost $47,388.52 for machinery and $51,859.57 for labor and freight, or $99,248.09; the water-works, $36,070.51 for plant and $20,851.15 for labor and freight, or $56,921.66; and the thirty-ton smelter and cupelling furnaces, $7415.50 for machinery and $9933.67 for construction and freight, or $17,349.17. The supplies and repairs for running the mill cost $108,231.41 and the labor, $28,430.77; the water-works, $2545.67, and the smelter, $375.60. In the mine, the supplies, including the cost of the hoisting-works, called for the payment of $26,174.16, while the labor for the mine development cost $91,470.07. Other items included in working expenses are: Freight on supplies, $7206.88; expressage on bullion and freight on ores, $14,013.65; expert examination, $2200; insurance, $1500; and interest account, $6584.46 on capital borrowed for construction and development, and repaid in full. Salaries, telegraphing, advertising, office and telegraphing expenses, $36,573.99. Including $500,000 dividends, the total expenditures were $1,029,825.58, leaving a balance of $65,877.53, to which added $75,000 bullion on hand unsold, made the total cash assets on March 13th, 1883, $140,877.53, out of which a dividend was paid on March 20th of $100,000.

The report contains no details as to the condition of the mines, or as to the working of the ores, which, it is understood, has not been an easy problem to solve. The only remark of interest is, that "the new Mill shaft has penetrated an ore-body at a depth of 300 feet, from which the inference may be drawn that the vein is continuous from the present workings, a distance of 600 feet, to the new shaft, pitching at an angle of about 45 degrees; and that there remains, entirely undeveloped, a large tract of mining property owned by your company, characterized by sure indications of the presence of the same formation of silver chlorides." Mr. Robert Bunsen, formerly of Leadville, has now taken charge of the mines.

THE CENTRAL MINING COMPANY, LAKE SUPERIOR, MICH.

The report of this company, one of the dividend-paying Lake Superior copper mines, has just been published. The product of the mine shows a further falling off, the yield having been 1,165,945 pounds of stamp copper, 399,885 pounds of kiln copper, and 98 masses, weighing 237,970 pounds—a total of mineral of 1,803,800 pounds. The quantity smelted was 960,737 net tons, yielding 70·44 per cent, or 1,353,597 pounds, of refined copper, of which 775,054 pounds were sold at an average of 17·80 cents, giving $138,014.66, leaving 578,543 pounds on hand, valued at 17 cents, or $98,352.31. The receipts for silver were $1126.02, making the total receipts $237,492.99, to which are added $5050.61 for interest, and deducted $11,767.50 for depreciation of value of mineral at mine, making the net receipts $230,776.10. The working expenses at the mine were $157,908.37, and the cost of smelting, freight, and other expenses was $33,850.15—a total of net operating expenses of $191,758.72, leaving a profit of $39,017.58, against $47,620.06 in 1881. The directors, however, sold timber lands on the Tobacco River for $100,000, payable in installments running over three years, and received in 1882 $40,000 on account. Against this they have written off $20,988.25, the cost of all the lands owned by the company, exclusive of the mine location, and they have thus added $19,011.75 to the profits of the year, enabling them to pay a dividend of $60,000. After the payment of the 1881 dividend, the surplus was $198,236.77, making the net surplus at the end of 1882 $277,254.35, less the dividend paid in February of this year, as above.

A large amount of work was done in the mine; but the vein has continued to be small in size, and although fairly productive in stamp rock and small pieces of copper, it has been almost destitute of large masses, hitherto so characteristic of it. In all, 4097 fathoms of ground were broken in openings and stopes, the average yield of mineral per fathom being 440 pounds, and of ingot 310 pounds. The average cost of sinking in shafts and winzes, 278 feet, was $28.09; drifting on the vein, 1288 feet, $10.50; drifting on the conglomerate, 149 feet, $12.11; sinking on the conglomerate, 192 feet, $16.29. Stoping on the vein, 1659 superficial fathoms, cost $15.26; and 37 cubic fathoms, $22.98; and on the conglomerate, 283 superficial fathoms, $23.62. The stamp-mill, in treating 18,639 tons of rock, running 24 heads 142 days, or 5·4 tons per day per head, required the following outlay:

Labor	$6,774.59
1913 cords of wood	6,217.25
Lights, oil, shovels	411.26
Repairs, materials, fixtures	2,653.44
Lumber, freight, and teaming	425.94
	$16,482.48

The cost of breaking and selecting the rock and tramming it to the mill was 11·6 cents, and the cost of washing and stamping per ton was 88·43 cents. The stamp rock ran 3·12 per cent of mineral, or 2·20 per cent of ingot. As the Central does not produce stamp copper exclusively, it is impossible to estimate the cost of mining this grade of copper from the data given. The mine yielded 1,803,800 pounds of mineral, running about 70·44 per cent of ingot, or about 1,270,596 pounds of copper, at a cost, including mining, crushing, smelting, and marketing, of $198,676.77, or 15·64 cents per pound, which shows, that the Central can meet present prices, even if it does not do better this year than it did last.

Mr. James Dunstan, the agent, in concluding his report, makes the following interesting statement: "The compressor and its accessories contribute materially to the reduction of our expenses, and enable us to drive, sink, and stope much more rapidly than was before possible. We now sink 100-foot lifts, and with underground engines, worked by compressed air, raise the rock from the bottom of the shaft to the first level above, which was impracticable, or at least expensive, with windlass and hand labor."

COAL USED IN THE MANUFACTURES OF THE UNITED STATES.

Aside from the great industries with which the coal trade is closely allied, statistics have been published in the Census Compendium on other branches of manufacturing which are worthy of attention. Thus, we find that in 1880 there were in the United States 5631 brick and tile-making establishments working with a capital of $27,673,616, and a force of 59,032 men, 268 women, and 7055 children, to whom the sum of $13,443,532 was paid. The yards used 1,157,522 cords of wood, $5,750,503 worth of other materials, and turned out products valued at $32,833,587.58. They made 3822 millions of common brick, 163 millions of fire-brick, 210 millions of pressed brick, $2,944,239 worth of tile, $1,765,428 worth of drain-pipe, and $729,926 worth of other products.

In looking over other industries, we find that the carpet mills used 60,641 tons of coal, the manufacturers of chemicals burned 273,161 tons of anthracite and 310,398 tons of bituminous coal, the works dyeing and finishing textiles used $1,904,551 worth of fuel, the manufacturers of felt goods consumed $77,437 worth of coal and wood, while the mills making hosiery and knit goods used fuel to the extent of $209,669. The manufacturers of mixed textiles burned 34,712 cords of wood and 134,362 tons of coal, while the salt-works used 541,179 cords of wood and 453,846 tons of coal, a small quantity being required besides in grinding salt. The silk factories use but little fuel, taking only $173,283 worth, while the woolen mills took in 1880 142,250 cords of wood and 359,769 tons of coal. For worsted goods, 72,779 tons of coal, valued at $308,421, were required. No details, unfortunately, are given as to the consumption by the glass-works.

The requirements for fuel are, of course, closely dependent in many industries upon the use of steam for power. The following table will show how the use of steam has been gaining ground during a decade in a number of industries:

	1880.	1870.		1880.	
	Total power.	Water-power.	Steam-power.	Water-power.	Steam-power.
	p. c.	p. c.	p. c.	p. c.	p. c.
Cotton goods	275,504	67·84	32·16	53·99	46·01
Flouring and grist-mills	771,201	70·74	29·26	60·94	39·06
Iron and steel	397,247	9·72	90·28	4·16	95·84
Lumber, sawed	821,928	50·93	49·07	33·91	66·09
Paper	123,912	78·25	21·75	70·70	29·30
Silk and silk goods	8,810	41·29	58·71	17·73	82·27
Woolen goods	106,507	62·17	37·83	50·33	49·67
Worsted goods	16,437	57·81	42·19	38·34	61·66

In the 85,923 industrial establishments in the country in 1880, there were in use 55,404 water-wheels, with an aggregate power of 1,225,379 horse, and 72,304 boilers and 56,483 engines, with an aggregate reaching 2,185,458 horse-power.

The merchant steam-ships of the country, to the number of 5139, with a tonnage of 1,221,206, used 3,827,993 tons of coal and 794,775 cords of wood, divided in groups as follows:

	No. steamers.	Tonnage.	Coal, tons.	Wood, cords.
New England	463	118,553	375,080	8,568
Northwestern lakes	947	222,290	488,610	255,629
Upper Mississippi	266	83,918	525,331	93,318
Ohio	473	107,472	676,347	16,474
Middle States	1,459	432,803	1,272,857	12,642
Lower Mississippi	315	48,303	184,951	112,254
Gulf of Mexico	126	41,610	41,993	62,556
South Atlantic Coast	266	30,833	64,995	66,825
Pacific Coast	319	97,005	146,407	103,446
Upper Missouri	44	12,099	6,281	53,063

ELECTRICAL TRANSMISSION OF POWER IN MINES.

As the question of the transmission of power by means of electricity is engaging a great deal of attention just now, we think the following abstracts of two recent articles will be interesting. They are taken from *Abstracts of Papers in Foreign Transactions and Periodicals*, Vol. LXXI., Part I., published by the Institution of Civil Engineers.

The first is entitled "An Application of Electricity to the Transmission of Power at the Mines of La Péronnière," by Messrs. Charousset and Bague, and is abstracted from the *Bulletin de la Société de l'Industrie Minérale*, Vol XI., 1882, p. 5:

The energy in this case is transferred through conductors 1200 meters (1309 yards) long, from the mouth of the pit to the head of an incline 110 meters (120 yards) long, where it is employed to drive a windlass and draw the coal-tubs up the incline. There are two generating dynamos and two receiving dynamos, connected by the four conductors so as to form two independent systems and circuits, of which it is not generally found necessary to employ more than one at a time. The connection between the Gramme dynamos and the driving machinery at one end, and between the dynamos and the intermediate gear of the windlass at the other end, takes place by means of friction-pinions made of compressed paper. The machines ride upon a center situated below each of their octagonal frames, and are kept up to more or less intimate contact by screws in the case of the generators, and by a sytem of levers, under the immediate control of the attendant, in the case of the receiving machines, care being taken to provide against excess of pressure by a stop. As these machines, when receiving a current, always run in the same direction, whatever may be that of the current, the intermediate gearing contains a system of conical sliding-pinions for reversing the motion of the winding-drum.

The four machines employed are all octagonal and similar to one another. The ring is divided into four parts, passing successively before as many magnetic poles, alternatively positive and negative. Each pole is formed by two coils whose cores are formed at right angles to each other, and have one pair of similar ends brought thus together.

The other ends of these eight cores are fixed in the octagonal frames, which therefore serve to connect opposite poles. Each of the four poles nearly completes the quadrant of a circle; and from the quadruple character of the magnetic field, four brushes are necessary to each machine. The coupling is in series; that is, the entire current flows through the electro-magnet coils of both the generating and the receiving machine.

The conducting cables are formed of sixteen copper wires of 1·1 millimeters in diameter, the metal employed being perfectly pure. At the beginning of operations, these wires, placed in juxtaposition, were first covered with a thickness of paraffined cotton, which again received two envelopes of cloth treated with Chatterton's compound, and was inclosed in India-rubber and tarred. But, in spite of these precautions, the insulation did not remain perfect, on account of the damp situations in which parts of the cable had to be placed. A covering of lead was tried in damp places, but this turned out dangerous in practice, and the cables finally adopted were as follows:

16 wires of copper 1·1 diameter,
2 coats of paraffined cotton,
1 coat 5 millimeters thick of gutta-percha,
2 windings of Chatterton cloth,
1 thick coat of tarred cotton;

and the purchasers themselves finally covered the tables with a paste of the following composition:

57 pints of Norwegian tar,
38 " resin,
5 " suet,

in order to protect them, as well from heated gases as from damp.

The original cable, still maintained in the dry parts of the mine, cost 1·25 francs per meter; that finally employed in the damp situations, 3 francs per meter.

The trouble which arose before the question of the cables was finally settled was instructive. When the cheaper cable was employed for the whole circuit, the insulation in damp situations became defective in about one month. Shocks were received by the miners even through the rock in the neighborhood of the conductors, and these shocks finally caused the rupture of the cables themselves. The nature of these ruptures was peculiar. The ends of the wires exposed were untwisted, and the surface had lost its polish, being honeycombed with little cavities filled with a brown, or sometimes black, dust. The paraffined cotton, which was very white when the cable was new, presented a green color, and this discoloration extended to the exterior of the cable, and even to the walls of the pit. At four or five centimeters from the ends, the wires were found to be intact. The oxide and carbonate of copper indicated a chemical action going on between the copper wires and the water in contact with the external envelope, under the influence of the electric current. It was on account of these ruptures that the lead covering was applied, but the safety of the cable was not found to be increased by this means. On one occasion, the men below observed some large sparks in the pit, which greatly frightened them. The driver, warned by the galvanometer that something unusual was taking place, stopped the engine, and an investigation showed that the lead had been melted in several places and thrown against the walls of the pit. Where the lead had been thus removed, the Chatterton cloth was calcined, and the wires presented globules of metal which had been fused. All this occurred in a quarter of an hour, the receiving dynamo running free at the time. Since the application of gutta-percha to the cables, no such mishap has occurred. The following case of leakage occurred one day: The hauling cables, which are of iron wire, are attached to cast-iron projections on the drum, and by this means were in metallic connection with the bed-plate of the whole underground part of the installation. These cables were observed suddenly to be electrified, and at the same time a current passed through the telephone wire and set the bell ringing. Otherwise, nothing abnormal took place in the running of the machinery. The phenomenon lasted two hours, during which it was impossible to touch the hauling cables without producing small disturbances, the effect increasing with the distance from the drum. On the bed-plate itself, no shock was forthcoming.

The sudden disappearance of the phenomenon shows that it was due to some passing cause—perhaps to the presence of metallic dust on the India-rubber washers separating the bed-plate from the circuit traversed by the electric current; or, it may be, to the contact of one of the cables at a faulty point with the earth; for it was at that time that the cables began to show faulty insulation.

On a subsequent occasion, a fault in the bottom insulation of one of the machines certainly caused a derived current, and the hauling cable, then no longer attached to the metallic framework of the drum, was electrified more strongly than on the previous occasion.

It is very necessary to keep the nuts which secure the brushes firmly in the sleeve or holder quite tight. The neglect of this once caused the loosening of the brush, with the generation of large sparks.

The needle of the galvanometer indicated a much stronger current than usual, and the steam-engine was pulled up as if by a brake. The paper friction-gear became at the same time heated.

The following table gives the usual performance of these machines. It is based upon an average of experiments. The galvanometer used is simply a needle, placed over the conducting cables. It will be observed that its indications are proportional to the squares of the difference of velocities:

Machines.	Work indicated in engine-cylinder per minute.	Useful work in coal raised per minute.	Indications of galvanometer.	Speed of generating dynamo. Revs. per minute = V.	Speed of receiving dynamo. Revs. per minute = v.	Difference of speeds $V - v$.	Practical efficiency.	Electrical efficiency = $\frac{v}{V}$.
	Ft.-lbs.	Ft.-lbs.	Degrees.				Per cent.	Per cent.
1. Steam engine quite unloaded	135,402	.....	.....	.....	.....	.....	.....	.....
2. Steam-engine in gear	198,763	.....	.....	.....	.....	.....	.....	.....
3. Steam-engine driving generating machine with circuit open	224,802	.....	.....	.....	.....	.....	.....	.....
4. Receiving-machine running unloaded	230,009	.....	4·5	1,280	.....	.....	.....	.....
5. Windlass running, with no coal-tub	264,728	.....	9·0	1,280	975	305	.....	.....
6. Windlass running, with one coal-tub	455,679	55,549	16·0	1,280	880	400	12·2	67·7
7. Windlass running, with two coal-tubs	526,776	96,778	19·5	1,280	830	450	18·6	64·8
8. Windlass running, with three coal-tubs	594,553	137,572	20·0	1,280	810	470	23·1	63·2
9. Windlass running, with four coal-tubs	663,989	173,592	25·5	1,280	780	500	26·1	61·0

The second abstract is taken from an article by M. Graillot, in the same *Bulletin*. It is entitled "Experiments on the Transmission of Power by Electricity at the Mines of Blanzy," and reads as follows:

These experiments were instituted in order to arrive at a knowledge of the efficiency to be expected in transmitting the energy of a steam-engine above ground to machinery in the mine. The motor employed was a condensing Watt engine, without expansion, whose efficiency was assumed to be, during the experiment, constantly at 0·60. An intermediate shaft, with pulleys and belts, conveyed the motion of the engine to the generating dynamo.

The distance, 634 meters (691 yards), was represented by two coils of cable, each 604 meters long, and composed of nine copper wires, 1·1 millimeter in diameter, enveloped successively in cloth, in India-rubber, and in lead. The remaining 30 meters (33 yards) were made up by a brass wire 5 millimeters in diameter. The receiving dynamo actuated the winding machinery by frictional contact with the intermediate gearing. The course of investigation adopted was to make a series of observations, by cylinder-diagrams, of the power necessary to drive the intermediate gearing alone at different velocities. This, reduced in the proportion of 10 : 6, was in each case deducted frem the power (reduced in an equal ratio) required in the various experiments with loads. The balance was taken to be the power transmitted to the generating dynamo, and this is finally compared with the useful work by the windlass in weight raised.

The results obtained are open to the criticism, passed upon them indeed by M. Rossigneux, that they rest upon the assumption of the constancy of the efficiency coefficient of the steam-engine under varying loads; but the results obtained are valuable, as showing the variation in the useful work when other conditions remain fairly uniform, and as qualifying the dogma that, as the work given out diminishes, the efficiency increases. The length of the conductors within the limits of these experiments seemed to have no sensible influence upon the efficiency. When the work to do was small, the efficiency was small, and rose as the work approached in value that for which the machinery was designed. Thus, with the long conductors, when the work utilized was 0·73 horse-power, the efficiency was 17·25 per cent; at 1·15 horse-power, it varied between 26 and 34 per cent; at 2 and 2¼ horse-power, between 40 and 51 per cent; and at 3¼ and 4 horse-power, between 37½ and 51 per cent. With the short conductors, at 1½ horse-power of useful work the efficiency was 28 per cent; and at 2 from to 3 horse-power, it varied from 40 to 51½ per cent.

A FRENCH authority gives the following summary of the number of cities in the world possessing telephones, and the number of subscribers:

Europe	161 cities.	30,066 subscribers.
Asia	7 "	420 "
Africa	4 "	240 "
America	186 "	56,090 "
Australasia	5 "	897 "
Total	363 cities.	87,713 subscribers.

The United States leads with 47,960 subscribers, followed by Great Britain with 7287, Italy with 5507, Canada with 5250, France with 4437, and Germany with 3613 subscribers.

CONCENTRATING ORES IN SOUTHWEST MISSOURI.

Written for the Engineering and Mining Journal.

Missouri produced, during the year 1883, 26,000 tons of pig-lead. Of this amount, 11,000 tons were smelted from lead ore mined in the southwestern part of the State, and partly in Cherokee County, the southeastern corner of Kansas. These mines yielded during the same time 57,000 tons of zinc ore, of which 50,000 tons were zinc-blende, and 7500 tons silicate of zinc. Of this amount, 25,000 tons were shipped to the zinc-works at La Salle, Peru, and Collinsville, in Illinois, and the rest went to the zinc-works at St. Louis, Rich Hill, and Joplin, in Missouri, and to Weir City and Pittsburg, in Kansas.

A large number of deposits of lead and zinc ore were opened during the year, and it may be safely stated that this year will witness a greater activity in mining than ever before. These deposits of lead and zinc are found in the Keokuk group of the Sub-Carboniferous limestone formation, and are very irregularly heaped and distributed. As the lead and zinc ore in these deposits is more or less mixed with flint and lime-rock, a marketable product can only be made by separating the lead and zinc from each other and from the gangue. This work is mostly done in a very crude way by pounding the disseminated ore with hammers and separating in Cornish hand-jigs. As this method is a very slow and imperfect one, it is losing ground, and well-constructed concentrating-works take its place. A good many modern plants have been erected during the past few years, and are in successful operation. Many more are projected.

This mining region, like many others, has been infested by patent-right men with patent machinery; but all their attempts and promises have proved failures, and large quantities of their machinery may be found in the rubbish-piles.

The first modern concentrating-works in this region were erected in 1878 in Webb City. Its capacity was 125 tons. Then followed those of the Granby Mining Company, in Lone Elm, near Joplin, and in Oronogo, each of 125 tons capacity. They are similar in construction to those of the Hecla Consolidated Mining Company, in Montana, built lately, and described in the ENGINEERING AND MINING JOURNAL of Deember 9th, 1882, page 306. Afterward, many smaller concentrating-works, most of them from 60 to 75 tons capacity, were built. All these works are well constructed, the machinery used being of the Clausthal or Hartz style. They all use the Blake breaker and crushing rollers for crushing the raw ore. For sizing the crushed material, revolving sizing screens in connection with hydraulic classifiers are used. The usual sizes made by screens are 15, 10, 7, 5, 3, and 2 millimeters; 2 millimeters and less subdivided by hydraulic classifiers into 2, 1, and ½ millimeters. For separating the sized stuff, the concentrators generally use the single Clausthal plunger-jig, in most cases four-sieved. Slide motion is employed for operating the plunger of the jigs for coarser, and eccentric motion for the finer grades. The Rittinger continuous side-discharge is used on jigs for coarser and middle grades—bottom-discharge for the finer ones.

All the slimes are treated on jigs running at very high speed and having very low beds. Besides the single Clausthal or Hartz plunger-jig, a double-acting jig-machine of the same principle is largely used. It differs from the single one in having three or four sieves on both sides of the jig-box, and the plunger compartments in the center. The plunger-rods are forked, and have a plunger on each side. One of these jigs forms in fact two complete three or four-sieved jigs, driven by one shaft. As one of these double jigs does not occupy much more room than a single one, it is possible to have works of large capacity in a small building.

Nearly all these concentrating-works in Missouri are constructed and built by F. De Stwolinski, at present connected with the Fort Scott Foundry and Machine-Works, Fort Scott, Kansas.

COAL MINING IN GREAT BRITAIN IN 1882.

The coal produce of the United Kingdom for the past year is now officially made known. Under the old arrangement, says the *Colliery Guardian*, the returns made to the mine inspectors of the output of coal were kept secret till the presentation of the full details to the Home Office. The Secretary of State has, however, announced his intention of publishing as early as possible statistical abstracts of the whole returns, and thus we are at this early date in possession of some most important information touching the coal trade of the past year. This information is conveyed in six summaries of the statistics for the twelve districts. The first summary shows the number and ages of the male persons employed both above and below ground, and also the number and ages of the females employed above ground, together with the quantity of mineral raised in each of the twelve inspection districts. It appears that 503,987 persons were employed in and about the mines under the coal mines act. Of these, 406,192 were employed underground, and 97,795 (of whom 4652 were females) employed above ground; thus showing, as compared with the respective numbers employed during the year 1881, an increase of 8510. Summary No. 2 gives the mining produce either in districts or counties, by which it appears that 156,499,977 tons of coal, 2,209,036 tons of fire-clay, 11,505,447 tons of ironstone, and 1,119,572 tons of shale, etc., were produced in the mines classed under the coal mines regulation act, including some iron pyrites, etc., found in working these mines, which is given separately in the respective districts. Comparing the above quantities with the output of 1881, an increase is shown in coal of 2,315,677 tons; fire-clay, an increase of 312,129 tons; ironstone, a decrease of 353,319 tons; and an increase of 99,614 tons in the quantity of shale, etc. No. 3 summary contains an account of fatal accidents and lives lost during the year 1882 in and about all the mines under the coal mines regulation act. The fatal accidents amounted to 876, and the deaths occasioned thereby to 1126, showing an increase, when compared with the summary of 1881, of thirty-two in the number of fatal accidents, and an increase of 172 in the number of lives lost. No. 4 summary shows the proportion which the accidents and deaths bear to the number of persons employed and the quantity of minerals raised. It appears that on the average, during the year under review, there was one fatal accident among every 575 persons employed in and about the mines, and one death by accident among every 447 persons employed, and that for each fatal accident 195,586 tons of mineral were raised, and 152,161 tons for each death by accident. During the year 1881, for every 587 persons employed there was one fatal accident, and for every death by accident 519 persons were employed, and for each fatal accident the larger quantity of 200,189 tons were raised, and for each death by accident also the larger quantity of 177,106 tons.

The following table, which we compile from the elaborate returns by districts, gives in detail the causes of fatal accidents and the mortality for the years 1881 and 1882:

	1881.		1882.	
	Number of accidents.	Deaths.	Number of accidents.	Deaths.
Explosion of Fire-Damp	31	116	35	250
Falls in Mine.				
Falls of side	114	114	127	129
Falls of rock	325	336	332	339
Total	439	450	459	468
In Shafts.				
Overwinding	5	5	3	3
Ropes and chains breaking	2	2	6	9
While ascending or descending by machinery	26	27	18	24
Falling into shaft from surface	5	5	6	6
Things falling from surface	6	6	7	8
Falling from part way down	30	30	23	26
Things falling from part way down	5	8	8	8
Miscellaneous in shafts	27	27	30	32
Total in shafts	106	110	101	116
Miscellaneous—Underground.				
Explosions of gunpowder	17	17	11	11
Suffocation by gases	6	10	4	15
Irruptions by water	...	...	1	1
On inclined planes	43	45	54	55
By trams and tubs	83	86	99	98
By machinery underground	8	8	6	6
Sundries underground	24	24	22	22
Total underground	181	190	197	208
On Surface.				
By machinery on surface	18	18	9	9
Boilers bursting	1	2	2	2
Miscellaneous on surface	68	68	73	73
Total on surface	87	88	84	84
Gross total	844	954	876	1,126

THE ORIGIN OF CRYSTALLINE IRON ORES.

At two recent meetings of the New York Academy of Sciences, Dr. Alexis A. Julien and Dr. J. S. Newberry presented papers on the origin of crystalline iron ores, and discussed points connected with the subject. The following is an abstract of Dr. Julien's paper as printed in the proceedings of the Academy:

Theories of two classes have been advanced, referring the origin of the crystalline ores to extraneous and indigenous origin. Under the first class, three may be mentioned:

1. *Meteoric fall*—This was suggested in reference to the huge hematite deposit of Cerro de Mercado, in Mexico.

2. *Eruption as dikes.*—A theory advanced to account for many foreign deposits, and also those of Huronian age in the vicinity of Lake Superior, etc.

3. *Sublimation into fissures.*—A theory founded on the observation of crusts of specular oxide of iron in the lavas of Vesuvius, etc.

Objections to these theories were briefly presented. The theories attributing the origin of crystalline ores to indigenous origin are of two kinds, chemical and mechanical. Several chemical theories have been proposed:

4. *Concentration from ferriferous rocks, or lean ores:* if siliceous, by thermal solutions; if calcareous, by carbonated waters. Sub-aërial processes of this kind can not account for the origin of submarine sediments, such as the crystalline iron ores.

5. *Saturation of porous strata by infiltrating ferriferous solutions.*—Such a process could not produce huge bodies of pure ore, nor the alternation of pure materials in the lean laminated ores.

6. *Infiltration into subterranean chambers.*—The form, lamination, and coincidence with the bedding planes separate the ore-bodies of crystalline character from recent deposits formed in this way.

7. *Derivation from deep-sea deposits.*—The form and structure of the nodules in the ooze differ widely from those of the ores under discussion, while the strata associated with the latter are evidently shallow-water deposits.

8. *The metamorphism of ancient bog-ores.*—This theory, now commonly accepted and taught in all the text-books, is unsatisfactory, from the absence of evidence, within the crystalline strata, of any terrestrial or sub-aërial surfaces on which such bogs or marshes could have rested: all the surfaces appear to be submarine.

9. *Violent abrasion and transport, by volcanic agencies combined with powerful currents.*—To this it has been properly objected that the results of such violent agencies would be altogether conglomeritic.

10. *Concentration and metamorphism of iron-sands.*—Abundant instances of such concentration are shown along our coasts, and the deposits found along the St. Lawrence often contain but five or six per cent of siliceous impurity. As the loose sands so concentrated consist at various localities of quartz, garnet, chrysolite, menaccanite, magnetite, etc., so we find in the metamorphic rocks their indurated counterparts, quartzite, garnetite, dunite, menaccanite, magnetite, etc. The intermixture of garnet with magnetite, or its intercalation in separate alternating beds, is as common in the rocks as in the present oceanic sands. The thin interlamination of magnetite, martite, or hematite with jasper, in the Huronian jasper-schist, corresponds with the still more frequent association now found along our sea-beaches. The abundance of ore-beds of pure magnetite, free from apatite, in the strata of the Lower Laurentian of Ontario, and of menaccanite, more or less mixed with the other ore, in those of the Upper Laurentian of Quebec, Canada, appears to correspond with the general distribution of magnetite grains through the gneisses of the former, and grains of menaccanite through the anorthosites and traps of the latter formation. In bog-ores, no concentra-

tion of titanic acid has ever been found; its abundance in the form of menaccanite seems necessarily to involve a mechanical origin, and a vast source of that mineral is presented in its form of fine distribution through the rocks mentioned.

In the discussion, Dr. J. S. Newberry said that he would not claim that the chemical theory best explained the origin of all bodies of iron ore, but he thought it was applicable to most. It was not limited to mere terrestrial deposits like bog-ores, but equally well accounted for marine deposits like the Clinton ore, which in his view was most like the magnetites and hematites of the Archæan rocks. At various places, iron-sands are accumulating on our present coasts, as at Moisé, on the St. Lawrence, on Long Island, and on the coasts of Japan and New Zealand. It is only reasonable to suppose that such accumulations took place in ancient times, and that these were represented in some of the ore-beds now known. The suggestion of Mr. Julien was new and important; but various facts, such as the presence of phosphorus, the absence of foreign minerals, and the retention of limonite structure, seem to indicate that nearly all of our important iron ore deposits had been formed by chemical rather than organic processes.

At a later meeting, Dr. Newberry elaborated his views in a paper of which the following is an abstract:

At a recent meeting of the Academy, Dr. Julien read an interesting and instructive paper on the origin of crystalline iron ores, in which he attempted to show that they are the product of mechanical rather than chemical agencies. In bringing this subject again before the Academy, it is not my purpose to attempt to refute, but rather to supplement and limit, the theory of Dr. Julien.

I will not deny that some of the beds of magnetic iron ore described by Dr. Julien, in the Alleghany belt, have been formed by the sorting power of shore-waves, and that he has made an important contribution to the literature of iron, by his careful study and description of these beds; but that such cases, if they exist, are exceptional, and do not affect the truth and validity of the organico-chemical theory, I shall endeavor to prove by a brief report of some facts which have come under my observation.

The most important deposits of iron ore known to exist in the United States may be grouped as follows:

1. Magnetic ores of the Laurentian rocks of Canada, the Adirondacks, and the Alleghany belt.
2. The Huronian hematites of Lake Superior and Missouri.
3. The crystalline ores of the Rocky Mountains and the Wahsatch.
4. The limonite ores of the Atlantic slope and the Mississippi Valley.
5. The Clinton ores.
6. The carbonates of the Coal Measures.
7. The spathic carbonates of New England, Idaho, etc.

The Laurentian magnetites form lenticular sheets, sometimes more than one hundred feet in thickness, and extending half a mile or more. In many instances, they are inclosed in walls of gneiss, slate, or marble. They often contain much titanium, and have, as almost universal impurities (somewhat vicarious with titanium), pyrite and apatite. Some of the beds are also highly charged with manganese; they usually contain but little silica and alumina, and are the richest of our iron ores.

The characters they present which seem incompatible with the theory of mechanical accumulation are the following: First, their great magnitude, combined with their prevailing purity. Secondly, the large quantity of apatite contained, which we must regard as of organic origin, and therefore supporting the chemical theory, and so different from the magnetite in gravity as to be impossible to be mingled with it by any mechanical agency. Thirdly, the occurrence of great sheets of magnetite between strata of limestone, like the Franklinite ore, or inclosed in layers of limestone and argillite, like the bog-bed at Marmora, Canada. The fact that the slate and the limestone are deposits from deep and quiet water seems incompatible with the view that these strata have been brought into their present association by mechanical means. Fourthly, the frequent impregnation of magnetites with manganese, a material of much lighter gravity, and an almost constant constituent of limonite, goes far to prove such magnetic beds chemical rather than mechanical deposits. Fifthly, the aluminous magnetites, like that of Croton Landing, which contain almost no silica, could hardly have been formed by the agency of shore-waves, which always mingle more or less sand with whatever they deposit.

For these reasons, I must consider the mechanical theory as inadequate to account for the genesis of most of the magnetites of Canada and of the Eastern States.

The specular ores of Lake Superior and Missouri offer objections to the mechanical theory, in both their regularity of deposition and their mineral character. First, they are sometimes interstratified with jasper—once fine siliceous sand—in layers of great regularity and of extreme thinness, a structure which would be the natural product of sedimentation, but hardly of mechanical washing. Secondly, they could never have been deposited as hematite by shore-waves, since this mineral forms an impalpable powder which never accumulates by itself. We must therefore suppose that all these great iron ore-beds are pseudomorphs after magnetite, or that they are the result of sedimentation by organic agencies and subsequent metamorphism.

The iron ore of Iron Mountain is inclosed in "porphyry"—probably a metamorphosed sediment really fused in place; but some of the masses of ore are thickly set with crystals of apatite, which afford an equally conclusive argument against the volcanic and the mechanical theory. In the ore of Simmons Mountain, masses of magnetite occur which retain perfectly their radiated, limonite structure, and there can be no question but that this has been deposited by a chemico-organic process.

The deposits of magnetic iron in Southern Utah—the most extensive of which I have any knowledge—are in places very conspicuously and evenly stratified, and thus exhibit all the signs of having been deposited as sediments. They are associated with limestone and a granitoid metamorphic rock. Along certain lines, the ore is thickly set with crystals of apatite, and some of the largest masses are in great part composed of magnetite, which shows everywhere limonite structure. From these facts, it is easy to see that these great deposits have not been formed by mechanical agencies.

In regard to the sparry carbonates which form vein-stones and the earthy carbonates of the Coal Measures, there can be no question of their origin. They have all been formed by chemical precipitation.

The Clinton ores are interstratified with limestone, form continuous sheets of great extent, and constitute on the whole the most considerable deposits of iron ore in this country. They were apparently formed in the same way that the granular lake ores are now deposited, by the precipitation of iron from solution in a water-basin, surrounded by land having a ferruginous drainage. The quantity of phosphorus they contain, derived from the organic matter deposited with them, is a conspicuous feature in the composition of the Clinton ores, and apparently explains its abundance in many of our crystalline ores. After a careful study of the structure, composition, and surroundings of our most important deposits of magnetic and specular ores, I am compelled to conclude that they have generally been derived from stratified deposits, accumulated by chemico-organic agencies, and once closely resembled our stratified ores of the Upper Silurian and Devonian; and that any beds which accumulated as iron sand on beaches must be rare exceptions to the general rule.

In the discussion, Mr. A. A. Julien pointed out that the theory thus presented by Dr. Newberry was a new one, and might be designated as the "lake-ore theory," in contradistinction to the marsh or bog-ore theory, now commonly accepted. The difference is sharply defined in the following quotations from the *Manual of Geology*, by Prof. J. D. Dana. In his discussion of the Upper Silurian deposits, that author states (p. 231): "The beds of argillaceous iron ore . . . could not have been formed in an open sea; for clayey iron deposits do not accumulate under such circumstances. They are proof of extensive marshes, and, therefore, of land near the sea-level. The fragments of crinoids and shells found in these beds are evidence that they were, in part at least, salt-water marshes, and that the tides sometimes reached them." Again he remarks (p. 357), concerning the American continent during the Carboniferous age: "It may have been long a region of barren marshes, and in this condition it might have received its iron ore-deposits, as now marshes become occupied by bog-ores."

In reference to the Laurentian deposits (p. 155), he states: "Limestone strata occurred among the alternations, and argillaceous iron ores, though vastly more extensive." And again, "The argillaceous iron ore has become the bright hematite or magnetite, and it is banded by or alternates with schist and quartz, etc., which were once accompanying clay and sand-layers."

However, it is hard to conceive the growth of crinoids and shells in salt-water marshes, even if reached by the tides, in the free abundance indicated by the crowded organic forms in the Clinton ore-beds, and of these the lake-ore theory presents a more satisfactory explanation. It also well accounts for the origin of the enormous ore-deposits of hematite, of magnetite still retaining a pseudomorphous structure after limonite, and of all iron ores rich in calcium phosphate. This theory is not necessary to account for the presence of pyrite, since the presence of any vegetable matter, for example, algæ growing and decaying in sands or mud, is always likely to produce the deoxidation of sulphates and iron oxide; nor does it account at all for the abundance of titanic acid and alumina in many iron ores.

On the other hand, the mechanical accumulation of iron sands, by agitation of the waves and currents, would appear to account more simply for the smaller but more numerous deposits thickly dispersed throughout the crystalline rocks, varying in size from scattered grains to little flakes and lenses a few centimeters in length, and even thick ore-beds many meters in thickness and diameter. The close association, often observed, of materials of widely different specific gravity—for example, shale and limestone with the magnetic ores—need not appear anomalous, since they may all have a shallow-water origin, deposited by marine currents differing in force and direction at different times. The absence of such mechanical deposits from the sedimentary formations is not established, since even some of the hematites and bog-ores may represent the results of oxidation and hydration of original magnetite sands; while, on the other hand, the huge beds of menaccanite found in Canada and elsewhere, which have not yet found their parallel among the sedimentary strata, may indeed show a certain difference of conditions during the deposit of the ancient crystalline rocks. The comparative regularity of the thin alternating laminæ which make up the ferruginous jasper schists of Huronian terranes appears analogous to that everywhere prevailing in a cross-section of beach sands along our oceanic border; while the mountain masses of this rock, with laminæ of magnetite, or of octahedra of martite after magnetite, or of hematite in triangular scales after martite—all these ores being remarkably free from calcium phosphate—are most simply explained by the accumulations upon a sea bottom, strewn alternately with fine siliceous silt, and with octahedra of magnetite. The presence of manganese oxide in iron ores may often be due, as at the Buckhorn mine in North Carolina,* merely to the decomposition of a manganese garnet originally concentrated as a mechanical sediment, while the concentration of titanic acid and of alumina in many iron ores is perfectly explained by the accumulation of heavy sands of menaccanite, corundum, etc. In a magnetic iron ore of specific gravity 4·5, occurring in serpentine at South Ham, Quebec, Canada, the percentage constitution reported † (Fe 44·69, Cr_2O_3 8·31, TiO_2 21·64) is equivalent to a mixture of three minerals known to occur in iron sands: magnetite 50, chromite 13, and menaccanite, 37 per cent.

The consideration of these facts would lead to the conclusion that the mode of genesis of a bed of magnetic iron ore may be often determined by the following diagnosis:

When the ore presents structural characteristics allied to those of limonite, or when hematite occurs in included masses, or when the ore contains a notable amount of phosphorus, a chemical origin is probably indicated.

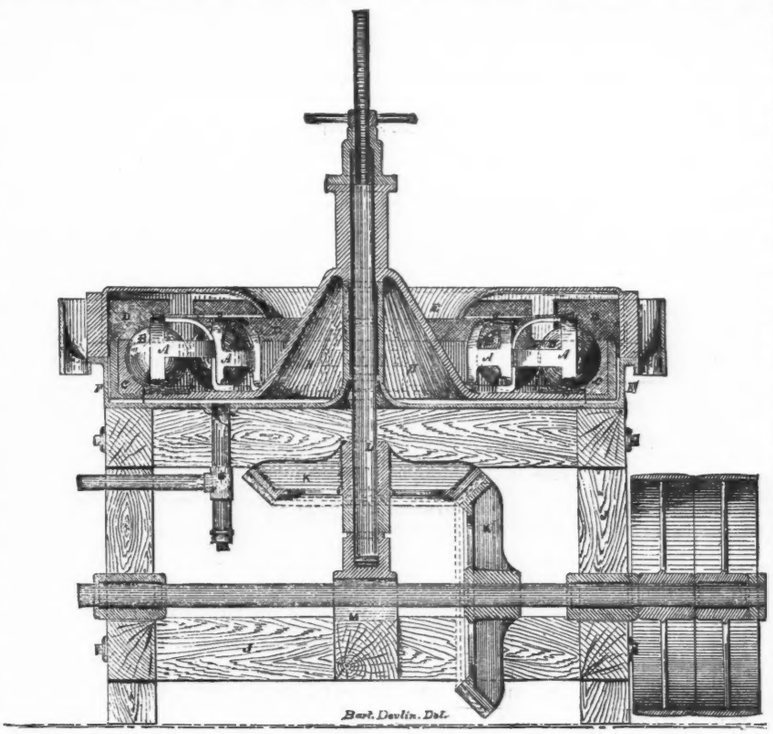
When the ore is almost free from phosphorus or is rich in titanic or chromic acid or alumina, or closely associated or mixed with granular garnet or olivine, a mechanical origin may be inferred.

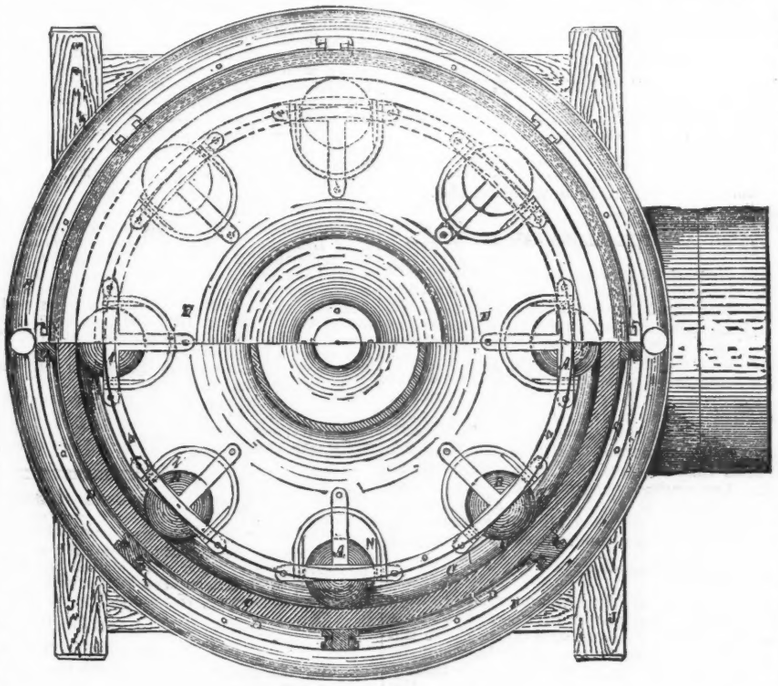
Mr. N. F. Darton stated that he had found over two per cent of chromic acid in the limonite ores of Staten Island, and Mr. N. L. Britton, from 1·6 to 3 per cent in the ores of the same region.

* W. C. Kerr, Geology of North Carolina, 222.
† B. J. Harrington, *Canadian Naturalist*, 1881, ix. 309.

THE MOREY PULVERIZER FOR WET CRUSHING.

In our last issue, we described the pulverizer for dry crushing recently brought out by the Morey & Sperry Mining Machinery Company, which we erroneously designated as a modification of the Howland pulverizer. We illustrate this week the wet pulverizer, working on the same general principle, the object being to reduce the friction and the loss of motion in the earlier machines of the same general type, and at the same time to overcome the mechanical difficulties of other constructions with which it has some features in common. The attrition of the material is brought about by the impact of the balls, propelled by centrifugal force and moving freely in their guards against the concave annular ring. The latter is 2½ inches thick, and weighs about 900 pounds; the principal wear, however, being on the balls, the ring, we presume, being to some extent protected by the ore forced by the rotation of the machine against its inner surface. Water is carried from below through the pipe *G* into the machine, the pulp being discharged through an ample screen surface *D* into gutters.





SECTIONAL PLAN.

Three sizes of machines are made: No. 1, having a ring five feet in diameter; No. 2, three feet; and No. 3, two feet. In the largest size, which we illustrate, eight balls, each weighing 70 pounds, are used. For the two others, the number of balls is respectively six and four, the corresponding weights being 47 and 20 pounds. When running at a speed of 200 revolutions per minute, the five-foot machine has an estimated capacity of from 1 to 1·5 tons of ordinary quartz through a 40-mesh screen, and requires from 12 to 15 horse power; while the three-foot pulverizer, it is estimated, puts from 0·5 to 0·75 ton through the same screen, with an expenditure of 8 horse-power, the rock being previously crushed in a breaker to about one half or three quarter inch size. The pulverizers use from 1000 to 1200 gallons of water per ton of rock, and weigh respectively, No. 1, 7000 pounds; No. 2, 3000 pounds; and No. 3, 1000 pounds; the weight of the heaviest part of the two larger sizes being 950 and 500 pounds respectively.

The operation of pulverizing is the same in wet as in dry crushing, the modifications of detail being such that facility of getting at and exchanging screens, balls, and the ring are provided.

A NEW COAL-CUTTER.—An item is going the rounds of the press to the effect that an ingeniously contrived device for coal-cutting has been introduced in England, the machine being, practically, a combination of inclined circular saws mounted upon a revolving rod, so that the groove cut by each saw runs into the groove cut by the next, thus thoroughly undercutting a seam. The saws are set on the rod obliquely, provision being made for retaining them at a proper distance from each other, and in the most suitable position on the rod, the end of which has a screw thread cut upon it, by means of which it is fastened into the spindle and bearings. In another form, the cutting apparatus is made from a flat bar of steel, with saw teeth along both of its outer edges, and so twisted that the toothed edges are formed into spirals. By this arrangement, the cutter readily clears itself from the slack which it cuts away. The cutters can be driven either by hand power or by compressed air, as may be desired.

THE COKE INDUSTRY.

Mr. Joseph D. Weeks, of Pittsburg, Special Agent of the Census Bureau, three or four weeks ago completed and filed with the proper authorities his report of the coke industry. This report is believed by Mr. Walker, Superintendent of the Census, to be the first one ever made officially on this subject; and, we may add, it will constitute the first complete report of any kind ever published on the subject. We give herewith a brief summary of the report. The original report gives the States in detail, dividing them into counties where manufactories exist.

There are 149 coke establishments in the United States, representing a capital of $5,545,058. The industry gives employment to 3142 people, 3068 of whom are males above sixteen years of age; 3 females above fifteen years; and 71 children and youths. The total amount of wages paid during 1880 was $1,198,654. During this year, 4,360,110 tons of coal were used, costing $2,761,657. The value of other material used was $233,784; total value, $2,995,441. Total amount of coke produced during the year, 2,752,475 tons; valued at $5,359,489. The coke establishments are distributed in ten States, as follows: Alabama, 4; Colorado, 1; Georgia, 1; Illinois, 4; Indiana, 2; Ohio, 15; Pennsylvania, 104; Tennessee, 4; Virginia, 2; West Virginia, 12.

The four establishments in Alabama represent a capital of $13,500; hands employed, males above sixteen years, 64; paid in wages in 1880, $38,500; materials, coal, 67,376 tons, valued at $75,314; value of other materials, $1304; total value, $76,618; total amount of coke produced during the year, 42,035 tons, valued at $148,026.

Colorado's one establishment has a capital of $150,000, and employs 75 hands, all males above sixteen years. Wages paid in 1880, $13,500; materials, 29,500 tons of coal, valued at $29,500; value of other materials, $600. Total values, $30,100. Total amount of coke produced during the year, 18,000 tons, valued at $90,000.

The one establishment in Georgia has a capital of $80,000, and employs 107 hands, all males above sixteen years. Wages paid in 1880, $13,837; materials 117,000 tons of coal, valued at $120,000; value of other materials, $4900; total value, $124,900. Total amount of coke produced, 70,000 tons, valued at $140,000.

The four establishments in Illinois represent a capital of $205,000; hands employed, 1670, and all above sixteen years except two children. Wages paid in 1880, $9347; materials, 15,000 tons of coal, valued at $15,000; value of other materials, $420; total value, $15,420. Total amount of coke produced during the year, 76,000 tons, valued at $124,000.

Indiana's two establishments represent a capital of $80,000; hands employed, four, all over sixteen years of age, all males. Wages paid in 1880, ——; materials, 1500 tons of coal, valued at $2025; value of other materials, $200; total value, $2225. Total amount of coke produced, 1000 tons, valued at $3000.

Ohio's fifteen establishments represent a capital of $144,012, and employ 153 hands, 150 males above sixteen years, and three youths. Wages paid 1880, $51,977; materials, 193,848 tons of coal, valued at $228,432; value of other materials, $5399; total value, $233,831. Total amount of coke produced, 109,296 tons, valued at $334,546.

Pennsylvania leads them all. Her 104 establishments represent a capital of $4,262,525, and employ 2444 hands, 2379 of whom are males above sixteen years, three females above fifteen years, and 62 children and youths. Wages paid in 1880, $983,431; materials, 3,608,095 tons, valued at $2,031,305; value of other materials, $209,849; total value, $2,241,154. Total amount of coke produced during the year, 2,317,149 tons, valued at $4,190,136.

The four establishments in Tennessee represent a capital of $200,021, and employ 114 hands, all males above sixteen years. Wages paid in 1880, $38,820; materials, 179,311 tons of coal, valued at $124,137; value of other materials, $8092; total value, $132,229. Total amount of coke produced, 91,675 tons, valued at $212,493.

The two establishments in Virginia, representing a capital of $30,000, were not operated during 1880.

The twelve establishments in West Virginia represent a capital of $330,000, and employ 163 hands, 159 males above sixteen years and 4 youths. Wages paid in 1880, $48,952; materials, 148,480 tons of coal, valued at $135,944; value of other materials, $3020; total value, $138,954. Total amount of coke produced, 95,720 tons, valued at $216,588.

Since the publication of Mr. Weeks's figures in the Census Compendium, the Secretary of Internal Affairs of Pennsylvania has printed his statistics for the coke industry in that State for the year 1882. His total shows a product of 3,216,544 tons of coke from 10,063 ovens. Fayette County leads, with 5522 and a product of 1,764,585 tons; followed by Westmoreland, with 3281 ovens and 1,075,305 tons. Somerset County reports 200 ovens and 64,525 tons; Huntingdon County, 200 ovens and 49,232 tons; Alleghany County, 159 ovens and 24,562 tons; Cambria County, 119 ovens and 39,438 tons; Blair County, 88 ovens, and 36,032 tons; and Clearfield County, 86 ovens and 20,281 tons.

THE DEPOSITION OF GOLD BY CHARCOAL.

In a long paper on the use of charcoal for precipitating gold from chlorine solutions, Mr. William Morris Davis, the patentee of the process, gives the results obtained during six experimental runs in the chlorination-works at the Yadkin mine, near Salisbury, N. C. Our attention has been called by a gentleman who carefully examined the figures to some slight errors in calculation and one important misprint. We give the tables as corrected:

NUMBER.	Tons worked.	Assay per ton.	Value of ore.	Gold, mint returns.	Compared with assay.
1	17½	$11.90	$208.25	$216.33	+ 46 cts.
2	30½	11.90	362.95	383.34	+ 67 "
3	9	25.20	226.80	237.99	+ 124 "
4	559	3.61	2,017.99	2,802.00	— 67 "
5	265	5.04	1,335.60		
6	1,082	7.25	7,844.50	7,513.16	— 30⅔ "
	1,963	$6.11	$11,996.09	$11,152.82	— 43 cts.

Mr. Davis, on page 285 of the Franklin Institute *Journal*, where his paper is printed in full, gives the following statement of cost of the process, labor, and other charges in a single filter:

Fourteen bushels charcoal at 5 cents	$0.70
Grinding and screening, ½ day at 60 cents	.30
One boy, regulating flow, 4½ days, at 25 cents	1.12½
One man burning coal, one day, 60 cents	.60
Reduction by crucible, fluxes, etc	1.50
Total, 80 tons	$4.22½
Or per ton	5·3c.

This, of course, is based on very low prices for labor and material.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Alabama Mineral Lands.—In view of the passage at the last session of Congress of a bill "to exclude the public lands in Alabama from the operation of the laws relating to mineral lands," the Secretary of the Interior has written to the district land officers in Alabama in part as follows: "In order to carry out the provisions of said act, it will be necessary to prepare a list of all public lands heretofore reported as mineral that have not been entered, and have them offered by President's proclamation. In the mean time, you will be careful not to allow an entry to be made for any lands lists of which were transmitted to your office October 23d, 1879, nor of other tracts that have been since investigated and reported as valuable for minerals. All existing *bona-fide* entries under the homestead laws may be perfected, regardless of the mineral character of the land. Any contest pending before you, where the *only* allegation is the mineral character of the land, must be dismissed. The law requires the offering to embrace all lands heretofore reported as containing coal or iron that remain undisposed of by entry or sale."

THE PULSOMETER IN GERMANY.—Herr Bartling, of Hanover, Germany, has communicated to a local society the results of a series of tests made with a pulsometer somewhat modified in construction. There is a special air-valve, which, by providing for a stratum of air between the water and the steam, reduces the condensation of the latter. In lifting to a hight of 32·81 feet, and running at 42 pulsations a minute, the water was heated only three degrees Celsius, in the old German style; while with the Ulrich modified pulsometer, it was heated only 1·5 degrees when running at 72 pulsations, and used about 5·5 pounds of steam to every 35·35 cubic feet of water delivered. In making comparative tests between pumps and the pulsometer, one kilogram of steam did 1800 kilogrammètres of effective work in the pumps, and 2560 kilogrammètres in the pulsometer, although the steam was moist, and the test was therefore disadvantageous to the latter. The greatest lift admissible for this pulsometer is given as 39·4 feet; but the maximum effect was obtained with 9·8 feet. The lift, of course, depends upon the steam pressure. High lifts, however, may be obtained with low-pressure steam by using several pulsometers one above the other. Thus, three of them delivered to a hight of 344·5 feet with steam of 4·5 atmospheres pressure. Horizontally, the suction-pipes may be carried as far as 900 feet.

FURNACE, MILL, AND FACTORY.

The Deane Steam Pump Company, of Holyoke, announces that it has secured a warehouse at Nos. 620 and 622 North Main street, St. Louis, Mo., from which it will make punctual distribution of its machinery to the Southwest, where its business has largely increased.

The Niles Furnace, at Niles, Ohio, has been leased by the Arnold Furnace Company for a term of years. The plant will be used in the manufacture of a special brand of iron, particularly adapted for stove plate and light machine castings.

Chicago claims to have 266 establishments engaged in the manufacture of iron, of which 8 are barbed wire works, 15 wire works and wire-cloth works, 28 machinery manufactories, and 4 car-wheel works. Capital invested, $17,400,000; workmen engaged, 18,600; value of product, $45,255,000.

The Scranton Steel Company, of Scranton, as we are informed by the president, has not yet started. It has merely been making a few preliminary heats, to test various points in connection with the works. It will be some time before it starts.

A representative of some of the principal mines in Chili recently visited San Francisco for the purpose of familiarizing himself with the improvements in copper smelting on the coast. After a thorough investigation of the whole matter, an order was placed for one of the Pacific copper smelters of Rankin, Brayton & Co., of San Francisco and Chicago, with the assurance that, if such results are obtained in Chili as are given in this country, they will adopt them for their whole system of working.

The St. Louis Furnace Building and Construction Company is getting out plans for two Siemens heating-furnaces and eight gas-producers for the new mill of the St. Louis Bolt and Iron Company at East St. Louis.

Capt. C. Hinsdale, general Western agent for the Berryman feed-water heater, has taken an order for a No. 5 heater from the Allouez Mining Company, of Allouez, Mich., and one from the Saginaw Mining Company, Saginaw, Mich.

Among the improvements to be made at the mill of Summers Brothers & Co., of Youngstown, Ohio, this spring, will be the erection of another set of sheet-iron rolls, a box-furnace for annealing iron, a scrap-furnace, and a set of new boilers.

Stokes & Parrish, of Philadelphia, are now turning out an unusually large amount of work in their particular line, and though they have enlarged their works considerably during the past two years, they are taxed to their fullest capacity. Among orders recently entered, we mention a furnace hoist, with its complete outfit, for the Everett Iron Company, whose furnace is at Bedford. The same company was supplied with a mining hoist for a 200-foot shaft. The firm has also just completed a furnace hoist for the Woodward Iron Company, at Wheeling, Jefferson County, Ala., and one for the Shenandoah furnace, at Milnes, Page County, Va. Considerable activity is also displayed in turning out hydraulic passenger elevators.

It is understood, says the Portsmouth *Register*, that the contracts for building the Kelly nail mill were let last week. The Messrs. Kelly state that the enterprise has reached a point of assured certainty, and the work will be pushed forward to completion as rapidly as possible. The contracts, we learn, were awarded to some three or four parties, with a view to securing the completion of all the work at the earliest moment, by dividing it. It is estimated that the machinery and other iron work will be on the grounds inside of six months. Messrs. Lambert Brothers have been awarded the contract for a portion of the work, which they expect to finish in half that time. The nail factory will have room for 120 nail machines, 60 of which will be put up at the start.

The Link-Belt Machinery Company has just shipped to the Patent Asphaltum Company, of Sydney, New South Wales, a car-load of link-belting and wheels and elevators for handling lime and crushed stone. The first-named company has also shipped a large quantity of belting to the Forest Fiber Company, of Berlin Falls, N. H., and lately placed two more sawdust conveyers in the mills of the Berlin Mills Company, of Berlin Mills, N. H., an elevator for handling shot in the works of Merrie, Verhage & Co., Cincinnati, Ohio, and a bran-conveyer with 160-foot centers and a capacity of 1000 pounds per hour, in the establishment of Robison & Co., Maysville, Ky. It has also orders for three conveyers and one pulp-elevator for the Hudson River Water-Power and Paper Company, of Mechanicsville, N. Y.

The Ryse Manufacturing Company, Indianapolis, Ind., is putting the machinery into its new shop to manufacture drop-forgings, pipe-wrenches, pipe-stocks, and dies.

The Ohio Powder-Works, of Youngstown, has completed its plant, and is turning out 250 kegs of powder per day.

The McTighe Electric Light and Manufacturing Company, capital $300,000, will erect a large manufactory in Pittsburg, Pa. Among the incorporators are F. B. Laughlin, of Jones & Laughlin, William N. Riddle, of the Pennsylvania Bank, Matthew McMullen, J. M. Patterson, and Thomas J. McTighe.

The Lechner Manufacturing Company, of Columbus, Ohio, has sent ten coal-cutters to the Pratt mines, at Birmingham, Alabama.

Messrs. Shields & Brown, manufacturers and sole proprietors of Bradley's insulated air-coverings for boilers, steam, gas, and water-pipes, are removing to new and more commodious quarters, at Nos. 78 and 80 Lake street, Chicago. By reason of the adoption of entirely new and improved machinery in their manufactory, the quality of their goods will be much improved, being finished up in better style than heretofore.

Henry R. Worthington, the well-known pump manufacturers, announce that on May 1st they will remove to their new stores, Nos. 86 and 88 Liberty street, in this city, and on the same day will transfer their St. Louis office from No. 707 Market street to No. 419 North Third street.

GENERAL MINING NEWS.

ARIZONA.

At the annual meeting of the Total Wreck Mining Company, held in this city, the following gentlemen were elected for the current year: John W. Shaw, President; A. E. Outerbridge, Vice-President; J. M. Requa, Treasurer; Edward Annan, Charles Spear, William H. Power, Walter L. Vail.

CALIFORNIA.

HOMER DISTRICT.

During the past winter, work, with the exception of a limited amount of prospecting, was entirely suspended in the district. Heretofore it has not been deemed expedient to attempt the working of the mines during the winter months, and until the present year the resumption of operations before the middle of May or June has been impossible. But this season, the mildness of the weather has made it possible to make an early start. There are numerous properties in the district that show up well, and many prospects are lying uncovered, whose owners are unable, from lack of financial backing, thoroughly to develop their mines.

INYO COUNTY.

A correspondent of the Inyo *Independent* says that the Defiance mine was located in the latter part of 1874. Two 30-ton furnaces were erected at a distance of three quarters of a mile from the mine, and were run for about a year at a loss to the owners. This was due principally to the high cost of transportation and the depreciation in value of lead. The cost of transportation then amounted to $80 per ton from and $47 per ton to San Francisco. The rates of freight are now much less, and for the past two years the mine has paid well. It has been worked to the depth of 212 feet, 500 feet in length, and 60 feet in

width. The company (known as Reddy, Gorman & Co.) proposes to carry this working down to the depth of 600 feet as speedily as possible. The facilities for doing this are good. The total yield of ore from the mine up to the present time is 18,000 tons, which produced 3500 tons of bullion—5·10 tons of ore producing one ton of bullion. The average value of the bullion has been $200 silver and $6 gold per ton. One notable fact is worthy of observation: The ore in the lower workings is of much higher grade than near the surface, carrying a larger per cent of both gold and silver. Assays have been made that gave a result of 820 ounces silver and $175 gold per ton. It is not the intention of the company to run its furnaces until August, as it prefers waiting until the railroad is completed to Owens Lake and thereby secure cheaper rates for the transfer of bullion. Nearly all the ores in the Defiance mineral belt contain gold. To the north of and adjoining the Defiance is the Cuervo mine. A fine-looking ledge of copper has been lying vacant for years but a short distance from Darwin. A location has now been made upon it, and the ore exhibited is of high grade, principally red and black oxides, assaying from 30 to 60 per cent copper.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—There were only 81 tons of ore hauled to the mill during the week ended the 31st ultimo, the snow-storm having interfered with transportation. The mill crushed 126·24 tons. The average assay value of the pulp was $32.95 per ton; that of the tailings was $5.02.

PLUMAS COUNTY—GREENVILLE DISTRICT.

TAYLOR-PLUMAS.—A dispatch to the New York *Tribune* states that the mill is running well. We are having a big rain and snow-storm. Outlook most encouraging. The secretary of the company says: The mill has been in operation since March 15th, and we may now look for a clean-up any day.

CANADA.

The abundant deposits of apatite in the Laurentian rocks of Canada are at present receiving the attention of investors. In Ottawa County in the Province of Quebec, preparations are making for extensive mining by the Union Phosphate Land and Mining Company, composed chiefly of Philadelphians. The property of this company was formerly owned by Mr. Preston, one of the pioneer phosphate miners. It is well selected, and will probably prove one of the best mines in the district. Application has been made to the Ontario government for incorporation, under the joint-stock company act, of the Northern Ontario Phosphate Land and Mining Company, by New York parties who own some very valuable tracts in the county of Renfrew, Ontario. The average analysis of several specimens taken from different beds or veins in this county shows 83·4 per cent bone phosphate of lime. The width of the veins, which are numerous, varies from 18 inches to six feet solid apatite. Another company is forming for the purpose of working some large deposits of apatite which have been found quite recently in the same county. The increase in shipments of phosphate to the English markets the coming season will be very large, and notwithstanding this, the great demand for high-grade apatite will, it is believed keep the price up. Prices quoted now in Liverpool and London are one shilling and five pence per unit for 80 per cent, the ruling price in Montreal being from $22 to $25 per ton. Considerable English capital, and not a little American, is going into this branch of industry, which certainly recommends itself.

At Charleston Lake, in the county of Leeds, large deposits of metallic oxide of iron have been discovered. Parties interested in the manufacture of mineral paint are examining them. A fine quality of specular iron ore has been discovered near Brockville in the same county. The Dominion government has provided in its recent changes of the tariff a bounty on pig-iron of $1.50 per ton for three years and $1 for the succeeding three years. This is done as an incentive to the establishment of furnaces. Brockville is considered one of the best locations in Eastern Ontario for a furnace. Its shipping facilities are second to none. There is railroad and water connection from all points; specular and magnetic ores in close proximity; and the country to the north is well wooded, so that an almost inexhaustible supply of charcoal can be had.

PROVINCE OF MANITOBA.

CANADA.—The shaft, recently started, is down eight feet. The vein, from present indications, has a scattered appearance, being divided into numerous small feeders, but so far no well-defined lode. Several pieces of rich-looking rock have been taken out, but the vein has no uniform character. At the bottom of the shaft, there are about two feet of antimonial iron, which carries a small percentage of silver.

WINNIPEG CONSOLIDATED.—The mill has begun crushing ore, and works satisfactorily. Arrangements have been made for the addition of five more stamps, and it is expected that they will be in operation within six weeks.

COLORADO.

BOULDER COUNTY.

We are in receipt of the following letter:

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In common with several other mining districts, Boulder County is enjoying (?) its semi-occasional "excitement." The Jamestown rush has already assumed larger proportions than any thing of the kind in the past history of the county, though, to blurt it right out, no new discoveries have been made that are paying.

Jamestown has had existence as a tenth-rate mining camp for about seventeen years. It is in the "telluride belt," though the new strikes are said to be of the character of the Leadville carbonates. The village is fourteen miles west of the thriving town of Boulder, which is the distributing point for the dozen mining camps of the county. Hitherto all that has kept the camp up has been the Golden Age mine, and some spasmodically-worked telluride veins.

Hayden, in his geologic map, puts all this foot-hill country under the head of "Metamorphic Rocks," and in his Report says nothing of eruptive rocks or sedimentary deposits existing in this region. There is, however, at Jamestown an apparent "blanket" formation, or something of that nature; for in the Buckhorn, Argo, and many other shafts, a supposed horizontal bed of low-grade lead ore has been struck. As yet no walls have been found, and the dip is uncertain. After sinking through a few feet of soil, in most instances alternate strata of yellow and red sand and clay are passed through, until, at from twenty to forty feet, the lead ore is met with. Out of a large number of assays made by one gentleman, the highest gave $37, and the next best $12 in silver ore. Returns of more than $100 per ton are, however, said to have been made for several lots of the ore shipped to the sampling-mill.

This, then, is the foundation upon which the "Second Leadville" is to be built, and in truth, at the present rate of increase, there will soon be people enough on the ground to make a city out of the hitherto quiet little community. Already the little eddy of two months ago has widened and deepened into a grand whirlpool of three thousand people.

The writer has passed through a number of similar experiences, and this is simply a repetition of the old story: Hills covered with survey-stakes, roads leading to camp crowded with people, hotels overflowing, saloons and keno "doing a land-office business," lots "sky-high," dance-houses building in hot haste, and every body excited except a few old settlers, who go about in a dazed way, and wonder what it is all about.

In a country full of veins of ore, it would be a marvel if not one among thousands of prospectors should discover any thing of value, and good finds will doubtless be made—possibly before this reaches you; but so far, nothing has been struck to warrant the excitement.

Meanwhile, other parts of the county are producing considerable ore of good grade. The tellurides have not "petered out" yet. Such mines as the Slide, Emancipation, Prussian, Inter-Ocean, Ingram, Keystone, Smuggler, and Cold Spring are almost daily shipping ore which runs—first-grade, from one to twenty thousand dollars per ton; second grade, from two to eight hundred; third grade, from sixty to two hundred; while the poorest part is successfully concentrated on Frue vanners.

For economy and facilities for working, for climate, for fuel, and for the advantages of civilization, Boulder County certainly surpasses any other mining district of the State of Colorado. It is remarkable, too, that the ores of almost all the other counties are represented here. Clear Creek and Gilpin mines have something like counterparts in Caribou and Ward; San Juan resembles that of Camp Albion; and Jimtown *may* turn out "carbonates." In the production of tellurides, however, Boulder has a monopoly, and the patent right covers not only this State, but the whole country; the Bassick mine and the California tellurium mines not yielding enough to mention in comparison. From the fact that, only five years ago, Professor Dana himself was ignorant that such tellurides as calaverite, sylvanite, petzite, etc., were mined in the United States in quantity, it is probable that comparatively few mineralogists are aware that to-day, in Boulder County, not less than fifty mines are producing such ore, or are capable of yielding it.

The report of the State Geologist for 1881 and 1882, just issued, gives a list of 246 minerals found in Colorado; of the fifty which are gold and silver-bearing, thirty-five are mined in Boulder County, the remaining fifteen being for the most part rare and commercially unimportant.

The two narrow-gauge railroads now building up Boulder and Four Mile and Left Hand cañons will touch at or near most of the mining camps before summer. The former is already running a construction train to within a few miles of Caribou.

THOMAS L. WOOD.

BOULDER, COLO., March 24.

CHAFFEE COUNTY.

STONEWALL.—The main shaft is sinking at present; and from the depth of 150 feet to the bottom of the shaft, 165 feet, the streak of good ore has widened from two inches to two feet, showing an increased percentage of copper, which indicates a higher value per ton in silver. The vein, fully thirty feet in width, carries an excellent quality of low-grade galena running from twenty-five to forty dollars per ton, and is all susceptible of successful concentration. While the ore is not entirely free from refractory elements, it is believed that it can be successfully treated on the spot.

CLEAR CREEK COUNTY.

The Colorado *Miner* gives the following as a portion of the ore-shipments from Georgetown during the month of March:

Boston & Colorado	440 tons.
Silver Plume sampling-works	130 "
Miners' sampling-works	70 "
Mendota mine	58 "

The Boston & Colorado agency paid out $57,559 during March for ore.

ATLAS.—The new low-grade ore-mill at Empire Station started up April 1st, and has been working successfully. The present capacity is from twenty-five to thirty tons daily, which will be increased to 200 tons if developments justify it.

GARFIELD COUNTY.

A correspondent of the Leadville *Herald*, in speaking of the Defiance Mining District, which is at present attracting so much attention, says: Fifteen miles of the approach to this camp must be made on snow-shoes, where the snow is at present from six to eight feet in depth. No prospecting can be done here for from six weeks to two months; prospectors who arrive here before that time can do nothing. There are at present about a dozen men in the camp, some of whom will go out within a few days. The formation here is limestone. Half a dozen mines or prospects are worked which all show well. The ore is a hard carbonate and galena, which is low grade and free smelting. The deepest shaft, and the only one of any depth that is worked at present, is seventy feet in depth. It is claimed by parties familiar with the camp that carbonate float can be found over an area of several miles around the mines that are now working. The best ore I have seen was a genuine carbonate of lead taken from a claim three miles from Carbonate City. The ore lies in perpendicular veins as far as development has yet proved. Prospectors and parties acquainted with the surrounding country claim that the limestone is only a cap-rock about two hundred feet thick, which lies on quartzite, the evidence of which can be seen in deep cañons which lead to the Grand River.

GILPIN COUNTY.

The placer mines along North Clear Creek and in Russell and Lake gulches are beginning operations for sluicing.

KEYSTONE.—The lessees are prosecuting development-work, and are gradually opening up a large amount of ground which will be removed by back-stoping. There are four shafts down at intervals along the vein, having depths of from 40 to 115 feet. The mill-dirt treated at Colonel Randolph's stamp-mill in Black Hawk is averaging 4 ounces gold per cord. It is estimated that there are probably $15,000 or $20,000 ore in sight.

KING.—Sinking will be resumed as soon as the machinery has been arranged. The shaft is to be continued on down 100 feet deeper, before driving any more levels.

ROLLINS.—Preparations are making to drive the lower cross-cut tunnel under Perigo Mountain, from its present heading. The company has a fine plant of air-compressors and power drills on the ground, which will be used instead of the slow method of hand-drilling.

WILLIAMS.—This mine, the property of the Gilpin County Mining Company, has improved lately, the mill-dirt averaging over 5 ounces gold per cord. Sortings from the old dump-pile are sent to the stamp-mill, yielding a good profit.

GUNNISON COUNTY.

GUNNISON.—Sinking is going on on the vein of the Comet lode. The shaft is about seventy-five feet below the tunnel level, making a depth of over 140 feet from the surface. The quartz or pay-streak is about eighteen inches wide, which shows some brittle silver. The quartz is crystallized, containing some white iron, and indications are very favorable for striking a body of mineral. The water is coming in very fast, caused by the snow melting. It is very probable that work will be suspended for a while on that account.

HINSDALE COUNTY.

CROOKE'S SMELTING-WORKS.—The smelter has been shut down for a limited period. Mr. H. W. Geist, of the Pueblo Smelting and Refining Company, has recently examined the Ute and Ulé ores, and as his works needed the lead which these ores contained in such rich proportion, he made an unusually flattering offer for them, which resulted in a contract to deliver 20 and 25 tons per day of the concentrates. This will take the present output of the concentrator. But it is expected that, when sufficient water can be had to run the concentrator full time and capacity, there will be a large excess over this amount, which will be treated here unless other arrangements should be made, in which case it is hoped that the smelter can be started again. It will not, however, be started until it is certain that sufficient ores can be had to guarantee a steady and uninterrupted run. The mines are in fine condition. The recent rich strike in the seventh level, west, of 2½ feet of mineral carrying largely gray copper, is not only encouraging but gratifying. The stopes in both the Ute and Ulé are yielding largely.

LAKE COUNTY.

Late Leadville exchanges contain the following product for the quarter ended April 1st :

Arkansas Valley	$485,562
American Mining and Smelting Company	333,040
A. R. Meyer & Co.	351,221
Shields Mining and Milling Company	18,000
Harrison Reduction-Works	467,694
La Plata Mining and Smelting Company	636,584
Tabor Milling Company	33,275
Grant Smelting Company	779,512
Leadville Gold and Silver Milling Company	46,410
Cummings & Finn	480,363
Other sources	1,000
Total	$3,662,662

The value of silver is taken at $1.10½ per ounce; gold, at $20 per ounce ; and lead, at $92 per ton, or 4·6 cents per pound. The basis of computation throughout 1882 was silver at $1.14 per ounce and lead at 5 cents per pound. To the depreciation in the price of these metals may be chiefly attributed the falling off from the product the first quarter of last year.

ÆTNA.—A large body of excellent fluxing iron has been opened up in this mine on Carbonate Hill. It was encountered in running a level from the Chadbourne shaft at a depth of 250 feet, and an uprise of thirty feet and a winze forty feet in depth have failed to show its top or bottom. Although low-grade in silver, this iron is of excellent quality for fluxing. In the old workings, a body of high-grade ore, similar to that found in the north shaft, has been struck, from which some very satisfactory shipments have been made.

BROOKLAND.—The shaft has attained a depth of 500 feet, and has passed through sixteen feet of mineral. The shaft being clear of water, drifting upon the mineral will begin.

MILES-AUGUSTA.—The lessees are at present working on a body of mineral which was opened recently in the ninety-foot level. The assays show that the iron carried 16 ounces in silver while the sand specimen returned 18 ounces in silver and 41 per cent of lead. The shaft is 250 feet deep, and is free from the water annoyance. Shipping will be commenced shortly.

M. R.—This company owns several mines on Mount Elbert, prominent among which are the M. R. and Boulder claims. Considerable development has been carried on for some time, and the building of a fine ten-stamp mill and concentrator at Twin Lakes has just been completed. Large contracts for ore have been lately closed, so that an abundance of mineral for treatment at the mill is assured.

ONLY CHANCE.—This mine, which is located in California Gulch, and which is operated under a lease, is now producing from twelve to fourteen tons of mineral per day, which carries about ten ounces in silver and forty per cent of lead. There is a 350-foot shaft, with a west drift of 60 feet, an east drift of 75, and a north drift of 50. Shipments are now made from the upper levels.

SUMMIT COUNTY.

FELICIA GRACE.—A vein four feet wide was recently opened up in the old incline. The workings heretofore have been mainly on the surface, as the vein was lost at a certain depth.

WHEEL OF FORTUNE.—Regular shipments are made from this mine. From three to seven car-loads are shipped every day. Heavier shipments will be made as soon as the roads are in proper condition.

DAKOTA.

BLUE LEAD.—A forty-ton smelter has been ordered and will be put up shortly. The ore uncovered thus far will yield, it is stated, at least 40 per cent copper.

CALEDONIA.—The mill is running sixty stamps on $7 ore, yielding a net profit of $5.50 a ton. The lower winze is steadily sinking, with no change in the general good character of the ore-body.

DEADWOOD HYDRAULIC COMPANY.—This company owns all the valuable placers but one in Deadwood Gulch. Last winter, it constructed a magnificent and costly bed-rock flume, purchased rights of way and much material preparatory to extensive work by the hydraulic process. Operations, however, have been delayed by the action of the owners of the excepted claim, who obtained an injunction restraining the company from taking water from its reservoir above the excepted claim, to the deprivation of the owners of the latter. This procedure is considered a sort of blackmail, as the claim has been worked repeatedly, and is pronounced barren.

ESTRELLA DE NORTE.—This property is in a good shape for an early resumption of work and a prosperous season. Its ground on Castle Creek was found rich wherever worked ; but owing to depth of bed-rock and a superabundance of water, it has been only superficially prospected.

FATHER DE SMET.—The superintendent's report from March 23d to April 1st shows : Ore extracted from first, second, and third levels, 2950 tons. Ore milled, 3000 tons. North end tunnel in 856 feet. Third level header in 177½ feet. Golden Gate North header in 55 feet. West cross-cut in 27 feet. Third level header connected with Italian winze.

ORO CACHE.—This company, which owns promising and well-developed locations on Spruch Gulch, contemplates the erection of a mill at an early day, but has not decided between a 40-stamper at the mine, where water is limited, or a 120-stamper on Whitewood, at the mouth of Spruce Gulch, 1½ miles distant. The latter will doubtless be agreed upon, in which event a narrow-gauge railroad will connect mine and mill.

ORO FINO —At present, there is no prospect of an early resumption of work. It is understood that the company has decided to put up hoisting-works, in accordance with the recommendation of the superintendent. If it does, the mill may possibly start up by the 1st of July.

SAM.—A vein of quartz was recently discovered, which in richness is said to exceed any thing that has heretofore been found in the mine.

THE HERMANN O'BRIEN & WARDNER COPPER COMPANY.—A smelter of thirty tons capacity has been ordered, and will probably be put in blast about the end of May. The ores of this mine are carbonates and oxides easily smelted. The uncovered portion of the vein is more than sixty feet, averaging 16 per cent copper. The owners state that the present plant is but a forerunner, as they confidently expect to quadruple their present capacity within the year.

TROJAN.—It is stated that this company will erect a 100-stamp mill on Spearfish this spring, work to begin at the earliest possible moment. The works will be about four miles from the mines, but connection will be made by means of a narrow-gauge railroad.

IDAHO.

According to the Wood River *Times*, the value of the ore ready for shipment and on the dumps at the mines is stated to be as follows: On the Eureka, $65,000 ; Bullion, $55,000 ; Mayflower, $62,000 ; Jay Gould, $25,000 ; O K, $48,000 ; Bates & Boyd, $30,000 ; Idahoan, $75,000 ; Mountain View and Rough & Ready, $20,000 ; Point Lookout, $15,000 ; Red Elephant, $8000. Total, $403,000. Large reserves are in sight in all the mines.

EUREKA.—A strike has been made in this mine, situated about nine miles from Hailey. The find so far consists of hundreds of tons of float which assays high in silver and is milling and roasting ore. Boulders are found, on the surface and partly covered, of all sizes and up to ten tons in weight, but no ledge in place. The course of the float deposit is northwest and southeast, and it is traced for miles. An open cut will be run on the bed-rock, to endeavor to cross the vein.

MAYFLOWER.—The first load of this company's ore was shipped to Omaha on the 24th ultimo. Shipments will be made regularly after this.

MAINE.

Our correspondent, "Dirigo," writes us as follows, under date of April 10th :

Captain Moyle, of the Blue Hill, has been West on business this spring, and now, I understand, has gone to England. During his absence, Captain Ludlow, formerly superintendent of the Young Hecla, will have charge of the mine. The company is sinking on the incline. The smelter is not running at present.

The Stewart has got a 12-inch by 36-inch engine in place for hoisting, running pump, etc., and work underground will now be resumed. Shaft No. 3 is down about 160 feet, and the first level will at once be started.

The Douglass has been laying a tramway in the incline ; therefore no sinking has been done for some time. The self-dumping skip is running and works finely. The refining-furnace will soon be completed. The concentrating-works have been running through the winter. After breaking and roasting, the ore is crushed by Cornish rolls, of which the mill has three sets. The soluble portion of the copper is then leached out. The ore is then passed over Bradford jigs. I hope to give a full description of the process soon. The long winter and great amount of ice, suspending navigation for so long a time, have made the coal run short ; therefore the smelters are not running at present, but will start up soon. The company will probably take about 1500 tons of rock per month from the mine this season, running 2½ per cent of copper. The company has an extensive plant and good management, and I see no reason to doubt its ability to get along without levying further assessments.

MICHIGAN.

The Houghton *Mining Gazette* reports the shipments of the following mines for March as follows :

	Tons.	Lbs.
Calumet & Hecla	1853	1555
Quincy	225	520
Atlantic	164	825
Franklin	160	210
Allouez	90	540
Pewabic	70	500
Peninsula	59	1630
Grand Portage	40	458

RED RIDGE.—A dispatch from Escanaba says that a cave-in occurred at this mine, between Quinnesec and Iron Mountain, carrying down the engine-house and also eight men. These men were on the surface. No one was at work in the mine. The cave-in embraced a space of seventy-five by fifty feet, and besides the men engulfed, took in all the mining machinery, including four large boilers, which fell a distance of 100 or 200 feet. It is believed that all the men are dead, and it is estimated that the recovery of the bodies will require a week or more.

MONTANA.

BOZEMAN TUNNEL.—The tunnel penetrates the mountain 700 feet from the east side, and about 450 feet from the west, making altogether about 1150 of tunneling finished, out of the 3600 feet necessary to complete the work. The track of the Northern Pacific is now this side of Bozeman two or three miles, and coming along rapidly.

KIT CARSON.—The owners have been at work for the past two years developing the mine, and besides a large quantity of good ore which they are reserving for home reduction, they have taken out enough rich shipping ore to about pay the development expenses. The prospects are reported to be favorable.

SUMMIT DISTRICT.

ALICE.—The *Inter-Mountain* says that developments are progressing as usual. On the 100-foot south level, 20 tons of free ore are extracted daily. From the 200-foot station, a south cross-cut was run during the past week, which has intersected the vein mentioned above. East and west drifts have been started. The ore-body is about the same width as in the level above, but is a sulphuret instead of a free ore. On the 700-foot level, nothing new is to be reported. The sinking of the winze, which is now 60 feet deep, is slowly but steadily progressing on good ore all the way down. The Magna Charta is producing daily 60 tons of ore. The most important development of the past week is the striking of the pay-chute on the 500-foot level at a point 90 feet west of the cross-cut, where three feet of 40-ounce ore are exposed. All other workings are looking as usual. The sinking of the pump-compartment of the main shaft, which is now 150 feet deep, will soon be resumed.

LEXINGTON.—Above the 300-foot level, the mine is well opened and shows good ore-reserves. The 400-foot level is also explored, one chute four feet wide and assaying $100 a ton having already been opened for 120 feet. The other workings of this level are also looking well. The mill is running satisfactorily.

MOULTON.—The new surface strike on the south vein is developing with splendid success, the bottom of the shaft, which is now about thirty feet deep, being all in ore of exceptionally fine quality, bucket samples assaying from 75 to 100 ounces. In the stopes between the 200 and 100-foot levels, the ore-body retains its width and richness, and the miners are extracting about 30 tons of forty-ounce ore per day. On the 300-foot level, explorations actively continue, and on the south vein, which was struck in the south cross-cut from the main level on the middle vein, a fine quality of ore is extracted. The chute is proving richer as it is opened westward. Where it was first intersected, the ore was of low grade

NEVADA.

BERRYMAN TUNNEL AND MINING COMPANY.

This company has been organized for the purpose of developing six mining claims, each 1500 feet long by 600 feet wide, upon Silverado Mountain in Pinto Mining District. Work on the property will be begun at once. None of these mines has been prospected to any great depth, but recent developments, particularly in the Diagonal mine, show that the ore-bodies continue as depth is attained. The intention of the company is to thoroughly prospect its ground, and by vigorous work this spring and summer determine its value. The surface ground is rich in fine float-rock, and is broken up and mineralized at almost every point.

GEDDES & BERTRAND.—This company employs at present 40 miners and 60 mill hands. Last month, about 58 tons of dry ore were worked per day in the mill. Developments continue to be made, and work at the different shafts and levels is pushed with vigor. The ore dips at an angle of 40 degrees from the main shaft, and is principally antimonial silver.

NAVAJO.—The official report for week ended March 29th shows total depth of shaft, 520 feet ; rock continues very hard ; no water yet encountered. Drift south, 450 level, extended 16 feet ; no material change to note. South drift, east lateral vein, 350 level, advanced 19 feet. Stopes and other workings throughout the mine are without material change. The ore milled during the past week averaged $239.01 per ton.

UTAH.

The Salt Lake *Tribune* says :

EMPIRE.—The sale is postponed until the middle of April. Hopes are expressed that the company will be able to keep its mine, and that capital will be put up to work it, without further difficulty.

MAMMOTH.—Pay-day passed without the needful remittances from England, and the employés took matte and other property in their possession pending settlements, which will doubtless be made within a few days. The furnaces are not in operation, but are bedded down, and can be started up at any time.

ONTARIO.—All the operations at the mine go forward well, and with a definite purpose. The water has become somewhat heavier than for a while back ; but whether this is caused by the melting snows from the surface or by percolations from the Empire can not be definitely stated, there being partisans to both theories.

FINANCIAL.

Gold and Silver Stocks.

New York, Friday Evening, April 13.

The mining market has been almost exclusively confined to dealings in Sonora and Robinson stocks, and the remainder of the market affords but little interest. It has been a fight to "squeeze out" the "short interest" in Sonora, and in consequence, the price of that stock has been manipulated up to far above its real value. After the third call to-day of the Mining Board, over three thousand shares of the stock were sold out "under the rule," showing that the "squeeze" had been successful in a small way. Robinson Consolidated has been manipulated in sympathy with Sonora. Amie, Elko Consolidated, and Decatur record large dealings, but were generally weak. Below will be found a complete summary of the market. The total number of mining shares sold at all the Exchanges aggregates 344,094, as against 421,415 last week.

The Comstock shares were very quiet at steady prices. California sold to the extent of 2285 shares at 20@22@21c. Consolidated Virginia was a little weak, under a small business, selling from 51@46c. Sierra Nevada records a small business at steady prices, selling at $2.25@$2.30. Union Consolidated had one small transaction at $3.75. Mexican had a moderate business and was irregular; it sold from $3.25@$2.88. Savage sold at $2.25, Yellow Jacket at $3.15, and Best & Belcher at $3.75. Sutro Tunnel was very quiet and steady, and sold at 20@21c.

The Leadville stocks were quiet and steady. Amie Consolidated records an active business, and was a little weak; it sold from 24@20c. Chrysolite was quiet and a little weak, selling from $1.20@$1.15. Dunkin records a small business at steady prices, selling at 23@25c. Hibernia sold at 3c. Iron Silver had a small business and was irregular; it sold from $2.80 @$2.95@$2.85. Leadville was quiet and steady, selling from 64@70c. Little Chief was moderately dealt in at irregular prices; it sold from 41@48@45c. Little Pittsburg was dealt in to the extent of 1400 shares at 60@65c. Big Pittsburg was quiet and steady at 17@15c. Climax sold at 6c.

The Bodie stocks were almost neglected. Bodie Consolidated was quiet and steady; assessment-paid shares sold at $1.40@$1.45, and assessment-unpaid shares at 95@85c. Standard has gained a little strength, under a small business; it sold from $6.50@ $7, with a business of 1305 shares.

The Tuscarora stocks were quiet and steady. Argenta sold at 85c., under a transaction of 100 shares. Navajo was moderately dealt in, and gained a little strength; it sold from $3.25@$3.40. Independence was quiet and steady at 65c. North Belle Isle records transactions to-day of 700 shares at 35@30c. Elko Consolidated has been very active and has been weak. This is owing to the assessment recently levied. It sold from 9@5c., the transactions aggregating 36,400 shares.

In the miscellaneous list, Alice has been quiet and strong, selling from $2.75@$3. Bassick sold at $9.75. Eureka Consolidated was irregular under a small business, selling from $6@$5.50@$5.75, assessment paid, and at $4.50, assessment unpaid. The Green Mountain stocks were quiet and a little weak. Gold Stripe sold at 5c. Green Mountain sold from 83@ 80c. Rising Sun sold at 3c., and Cherokee at 2c. Hall-Anderson records a fair business at very irregular prices; it sold from $1.50@$1.85@$1.55@ $1.85, the business amounting to 6100 shares. Homestake declined from $15.50@$15, with a small business. Horn-Silver was quiet and strong, selling from $7.75@$8. Northern Belle rallied from its recent weakness, and was strong at $9@$9.50 under a small business. Robinson Consolidated records a very active business at irregular prices; it rallied to-day, however, and was strong, closing firm; it sold from 69@88@84c., the transactions amounting to 94,800 shares. Sierra Grande was rather quiet at irregular prices, closing weak to-day; it sold from $1.75@$1.95@$1.75. Silver King continues to grow weaker, and this week declined from $10.50@$10 under a small business. Spring Valley, under small transactions, was strong, selling from $1.50@$1.85@$1.75.

Alta-Montana has been quiet and steady, selling at 8c. Bradshaw records a small business at steady prices, selling from 30@28c. Bull-Domingo sold at 7c., with a very small business. Central Arizona was dealt in to the extent of 300 shares at 30c. Decatur was active and irregular, selling from 4@6@ 5c. Eastern Oregon sold from 50@60c. Harlem M. & M. Co. was moderately dealt in at strong prices; it sold from $1.50@$1.45. Lacrosse sold from 14@11@13c., with transactions of 10,500 shares. Oriental & Miller was very quiet and was steady; it sold from 18@16c. Silver Cliff records but a small business, and was steady at 35c. Sonora Consolidated has been active and very strong; it sold from 37@$1.45, closing to-day at $1.25, the business amounting to 69,400 shares. South Pacific was quiet and steady at 6@5c. The State Line stocks were quiet and steady; Nos. 1 and 4 sold at 2c., and Nos. 2 and 3 at 5@6c. Taylor-Plumas declined from 17@13@14c., under a small business.

MEETINGS.

The Centennial Copper Company, No. 1 Pearl street, New York City. Annual meeting of stockholders and election of directors, April 23d, at twelve o'clock M.

The Hite Gold Quartz Company, Room 88, No. 35 Broadway, New York City. Annual meeting of stockholders and election of trustees, April 19th, from twelve to one o'clock P.M.

DIVIDENDS.

The Homestake Mining Company, of Dakota, has declared a dividend (No. 56) of $50,000, payable April 25th. Transfer-books close on the 20th. Total amount of dividends paid to date $1,962,500.

The Northern Belle Mining Company, of Nevada, has declared a dividend of 50 cents per share.

The Oxford Gold Mining Company, of Nova Scotia, has declared a dividend (No. 2) of five per cent on the capital stock, payable April 20th. Transfer-books close April 14th, and reopen April 21st.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, Petroleum and Mining Brokers, No. 55 Broadway, report as follows for the week ended April 13th, at noon:

At the date of our last report, oil was selling about 91⅛c., and the decline which had been in progress for a week was not arrested until Monday, the 9th, when prices touched 88c. From that point, a recovery began, and on April 11th, the market, which opened at 89⅝c., closed at 96¼c. On Thursday, the 12th, the market opened at 98⅛c., and during the day sold down to 95⅝c., closing at 96⅛c. This morning, it opened at 95¾c., sold down to 93¼c., and closed at 93⅜c. bid for the noon session.

The influences that operated to depress the market from $1.10, the price which prevailed three weeks ago, were, first, a desire by long holders to realize, and the creation of a considerable short interest in view of the new wells which were expected in the Balltown District. These wells, the Welch, the Murphy, and Grand in No. 6, were held over the trade as a *bête noire*, and the idea was, that if these wells became producers, it would extend the area of productive territory. As a matter of fact, they did start off with a pretty good production, but this soon fell off. The decline in the production of these wells, and the increasing shipments to the seaboard from the oil region, started a buying movement that may advance oil to higher figures during the month, with occasional reactions meantime. It is understood that the Standard Oil Company, which heretofore has made contracts for refined oil for the summer months, declines to make such contracts at the present rate for refined later than May 1st. The German and foreign buyers are holding off for lower figures; but the presumption is, that the Standard will be interested in marking up the price of crude oil, in order to make a demand for refined, which can be more advantageously disposed of when the crude market is strong and advancing.

On Tuesday last, the members of the National Petroleum Exchange voted to adopt the amendments to the constitution necessary to effect a consolidation with the New York Mining Stock Exchange. The vote stood 335 for and only six votes against them. A vote was taken on Thursday for the fifteen members of the governing committee of the consolidated Exchange to which the Petroleum Exchange is entitled, and the following ticket was elected: Three years—Charles G. Wilson, Henry H. Truman, J. S. Stanton, Emil Schalk, and James F. Hughes; two years—Randal H. Foote, C. F. Schramme, Howard Bird, W. J. Osborn, and S. S. Sonneborn; and one year—F. H. O'Connor, James E. Little, E. H. Bunker, H. A. Heiser, and C. G. Fales.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
April	7....	$0.91	$0.92⅜	$0.91	$0.91¼	340,000
	9.. ..	.92¼	.92½	.88⅞	.89⅜	633,000
	10.....	.89	.91¼	.89	.90	794,000
	11.....	.90	.96⅛	.89¾	.96	959,000
	12.. ..	.97⅝	.97⅞	.95⅝	.96¼	623,000
	13.....	.95¼	.96⅛	.93⅜	.94½	683,000
Total sales.						4,032,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been dull. The principal business done was in the shares of the middle Comstocks, and they were quite active at advanced prices. The remainder of the Comstock market was quiet and weak. Outside stocks were but moderately dealt in and were steady. The Yellow Jacket Company has rescinded the dividend recently declared, owing, it is said, to legal difficulties. The following assessments have been levied during the week: Alta-Montana, twenty-five cents per share; Elko Consolidated, fifteen cents per share; and Scorpion, ten cents per share.

SAN FRANCISCO MINING STOCK QUOTATIONS

Daily Range of Prices for the Week.

Name of Company.	Closing Quotations. April 6.	April 7.	April 9.	April 10.	April 11.	April 12.
Albion	.....	.....	.....	.....	.....	.....
Alpha	1¼	1⅛	1⅛	1¼	1¼	1¼
Alta	7-16	11-32	11-32	5-16	¼	¼
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	27-32	.....	13-16	21-32	11-16	13-16
Belle Isle	9-16	9-16	.....	½	7-16	7-16
Best & Belcher	3¾	3¾	3⅞	3¾	3⅞	3¾
Bodie	1⅞	1½	1½	1½	1¼	1¼
Bullion	.....	.....	.....	.....	.....	.....
California	3-16	.....	3-16	.....	¼	3-16
Challar	.....	.....	.....	.....	.....	.....
Con. Virginia	9-16	½	½	7-16	½	7-16
Crown Point	1⅛	1⅛	1⅛	1⅛	1⅛	1¼
Elko Cons	.....	.....	.....	3-32	.....	3-32
Eureka Con	5¼	5	5	4¾	4¾	4¼
Exchequer	¼	¼	¼	¼	¼	¼
Gould & Curry	2⅛	2⅛	2⅛	2⅛	.....	.....
Grand Prize	½	½	½	½	½	½
Hale & Norcross	3⅛	3⅛	3⅛	2¾	3⅛	3
Independence	11-16	.....	.....	11-16	29-32	.....
Martin White	5-16	5-16	¼	¼	¼	.....
Mexican	3⅛	3⅛	3¼	3	3	2⅞
Mono	.....	3-32	.....	.....	.....	.....
Mount Diablo	.....	.....	3⅝	3¾	3¾	3¼
Navajo	3⅝	3¾	3¼	3⅜	3⅜	3⅜
Northern Belle	8⅝	8¾	8⅝	8¾	9	9¼
North Belle Isle	.....	.....	.....	.....	.....	¼
Ophir	2⅝	2⅝	2⅝	3⅝	2⅜	2¼
Overman	.....	.....	.....	.....	.....	.....
Potosi	1¼	1⅛	1¼	15-16	1	15-16
Savage	2¼	2¼	2¼	.....	2⅛	2
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nev	2⅛	2⅛	2⅜	2⅛	2⅛	2⅜
Silver King	10⅛	10¼	10⅛	10	.....	10¼
Tip Top	.....	.....	13-32	.....	.....	.....
Union Con	3¾	3¾	4	3¾	3¾	3⅝
Wales Con	.....	¼	¼	3-16	.....	3-16
Yellow Jacket	3	2⅞	2⅞	2¾	2¾	2⅞

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, April 12.

The market for copper stocks continues dull, with prices still tending downward, and the outlook is far from encouraging. The dealings are confined to a few specialties, and there seems to be a greater desire to sell on the part of holders, who see in the future a reduction of dividends, and a possibility of some of the mines being obliged to pass dividends altogether. Ingot copper continues weak, and one party said yesterday that it could not be bought below 16 cents, and was hard to sell at that price. This tendency, of course, checks all speculation in copper stocks for the present; but those who hold on to their stocks will doubtless see a turn in the market within the next six months, and be enabled to sell at better prices. Calumet & Hecla declined to $239½, against $241 last week, and closed offered at $240. Franklin declined from $11¼ to $10½, with later sales at $11, which was bid. Some exceptions have been taken to our remark of last week, "that the decline in ingot copper would doubtless prevent the payment of a dividend the coming year." We are told by a party who ought to know that a dividend will no doubt be forthcoming, notwithstanding the lower price for ingot. Time will show which is correct. Pewabic is almost entirely out of the market. The call for another dollar assessment on this stock does not hold out much inducement to buyers, and those who are holders are obliged to keep their stock and pay the assessment, or let it go by default. The only sale the past week was 10 shares at $4. Quincy is weak, and shows a decline from $49¼@$46½, and closed at $46½ bid. A considera-

ble amount of this stock has changed hands the past week, every effort to sell being followed by lower prices. Osceola has been fairly active and quite firm at $27@$26½, being offered at the latter price to-day, and no bid. Huron, which declined last week to 50c. per share, has shown a fair degree of activity, and advanced to 87½c; but the announcement of another assessment of $1 per share caused it to weaken and decline to 62½c. National declined from $1⅛@75c., probably in sympathy with its neighbor, the Huron, and a fear that they may be treated to a similar "Irish dividend." Allouez declined from $2¼@$2.

In silver stocks, about the only feature is the activity in Catalpa, which has advanced from 47½@70c. on sales of 16,000 shares. The advance is said to be due to the improved outlook of the mine. Bonanza declined from $2¼@$2⅛. Silver Islet sold at $3, same as before. Crescent, 22½c. San Pedro, 57½@60c.

At the Boston Mining and Stock Exchange, business continues to rule dull and featureless. The public manifests no anxiety to operate in mining stocks as a rule, and most of the transactions recorded are made by room traders. In Catalpa, Crescent, and other stocks dealt in by the old Board, there is more or less doing every day as between the Boards; but in the specialties of the Mining Exchange, the trading is very limited. Massachusetts & New Mexico, which formerly was an active stock and generally looked upon as a first-class mine, seems to have literally melted away; the stock selling at 7@8c., with an assessment of 5 cents per share paid. Empire, also an old-time favorite, has settled down to 16@17c., and is barely held at these figures by its friends. Bowman Silver, recently listed and put upon the market at 16@17c., has been hammered down to 9@10c. Brunswick Ship's Berth Company is dealt in quite extensively, and offers by its fluctuation, a good margin for "turns."

3 P.M.—At the afternoon Board, Catalpa advanced to 75c., but later sold at 72½c. Crescent sold at 25c. Huron declined to 50c. again. Quincy declined to $46. San Pedro, 57½@60c. Closing prices:

Allouez, $2¼ asked. Atlantic, $11@$12 asked. Bonanza, $2@$2⅛ asked. Antimony, $14@$15 asked. Calumet & Hecla, $240 asked. Catalpa, 75c. asked. Crescent, 25c. asked. Franklin, $10½@$11. Harshaw, $¾. Huron, 50c. bid. Osceola, $26½. Pewabic, $5. Quincy, $46 bid. San Pedro, 55c. bid. Silver Islet, $2½ bid, $3 asked. Sullivan, $⅝@$⅝.

METALS.

NEW YORK, Friday Evening, April 13.

Copper.—Buyers apparently have not got over the shock of the recent decline in Lake, it would seem, because they expect a further decline. We hear that there have been sales of Lake equivalent to 15⅜c. here, at Waterbury, but little has been done here. English advices state that the quantity of Lake copper placed there is 7000 tons. In other branches, little is doing at the range of 14½@15½c., according to quality. As indicating the export movement of "furnace material," we may state that to date there have been shipped for this month alone 12,309 sacks, or fully 600 tons.

Messrs Richardson & Co., of Swansea, quote, under date of March 31st, ores and regulus 12s. 9d.@13s.3d. per unit, while Messrs. French & Smith, of London and Liverpool, quote ore 12@13s. net.

The private sales at Swansea, during the month of March, consist of 315 tons of New Quebrada yellow ore at 12s. 6d.; Cueva de la Mora precipitate, 330 tons, for delivery in Liverpool, at 13s., 1163 tons at 12s. 9d.; and 32 tons of Aljustrel a t12s. 7½d. per unit.

We note that Wyoming copper, reported to be very good-looking metal, has for the first time made its appearance in this market.

England, by cable, is unchanged, quotations being £64@£64 5s. for Chili Bars, and £70@£70 10s. for Best Selected.

Lead.—The movement to depress the market having ceased, this metal has nominally reacted, though there is no business to report. We quote Common lead nominally 4·50@4·57c.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day:

Our market is firm. Sales on Monday were 140 tons of Refined at 4·20c., and 200 tons at 4·23c. for April delivery; on Tuesday, 80 tons of Hard lead at 4·12½c.; on Wednesday, 300 tons Refined for May delivery at 4·23c.; and to-day, 180 tons Chemical lead at 4·12½c.

Tin.—The market has been dull and business of a limited character, with a tendency to lower figures based upon Singapore and London. We quote Straits spot 21c. cash. London cables £94.

Spelter.—We have no transactions of any magnitude to report. We quote: Common Domestic, 4·70@4·85c.; and Silesian, of which there is very little here, 5⅛@5¼c. London cables £15 5s.@£15 10s.

Antimony.—The market has been very quiet. We quote 9⅛@10c. for Hallett's, and 10⅛@11c. for Cookson's.

BULLION MARKET.

NEW YORK, Friday Evening, April 13.

The absence of strength, noted in our report of the silver market last week, has become more marked, and the indications are, that lower figures will be made the coming week.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
April 7....	50¾	110¼	April 11....	*	109⅞
9....	50⅝	110⅛	12....	†	109⅝
10....	50⅝	110⅛	13....	†	‡

* 50⅛@50 9-16. † 50 9-16@50½. ‡ 109⅝@109¾.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended April 13th, as compiled from various sources, amounted to $254,505.45, as against $236,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,072,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended April 7th	$383,224
Corresponding week last year	925,500
Since January 1st, 1883	4,527,834
Corresponding period last year	13,987,253

Imports.

Week ended April 7th	$938,039
Corresponding week last year	24,988
Since January 1st, 1883	5,784,506
Corresponding period last year	1,110,601

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of March.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$147,807
*Alta-Montana, G. L. S.	"		$10,625
*Belmont.	"		7,432
Bodie, G. S.	Cal	21,459	66,257
Bodie Tunnel, G.	"	12,747	34,849
*Bonanza King, G.	"	64,000	177,132
*Boston & Montana, G.	Mont		34,936
*Central Arizona, S.	Ariz		15,627
*Christy, S.	Utah	20,086	65,924
*Chrysolite, S. L.	Colo		57,435
*Contention, S.	Ariz	85,713	284,259
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		84,556
*Derbec Blue Gravel, G. S.	Cal		16,602
*Father de Smet, G.	Dak		69,189
*Frisco M. and S. Co., G. S. L.	Utah		43,923
*Homestake, G.	Dak		211,348
*Hope, S.	Mont		20,574
Horn-Silver, S. L.	Utah	285,000	764,000
*Independence, G. S.	Nev		10,173
*Kentuck, G. S.	"		4,262
Lexington, S.	Mont		192,365
*Little Pittsburg, S. L.	Colo		11,875
*Marguerite, G.	Cal		25,900
*Martin White, G. S.	Nev	35,166	121,453
*Moulton, G. S.	Mont		88,588
Mount Diablo	Nev	9,857	9,857
*Navajo, G. S.	"	68,833	211,980
Northern Belle, S.	"	46,225	267,315
*Ontario, S. L.	Utah		364,067
*Oxford, G.	N. S.	6,620	15,143
*Pinal Cons., S. L.	Ariz		$49,810
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		34,246
Standard, G.	Cal	74,727	263,006
Star, S.	Nev		27,095
*Stormont, S.	Utah	19,770	54,604
Syndicate, G.	Cal		9,217
Tintic M. and M. Co.	Utah		7,632
*Tip Top, S.	Ariz		‡22,983
*Tombstone, G. S.	"		123,452
Yellow Jacket, S.	Nev	69,797	98,753
Total amount of shipments to date			$4,185,322

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G.* Gold. *S.* Silver. *L.* Lead.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 13.

Mr. Edward J. Shriver, Secretary of the New York Iron and Metal Exchange, has compiled the following statement of the stocks in bonds in New York, Philadelphia, Baltimore, and New Orleans:

	Jan. 1.	March 1.	April 1.
Pig-iron	6,330 tons.	8,872 tons.	9,268 tons.
Spiegel-iron	4,131 "	3,674 "	3,388 "
Old rails	5,504 "	6,019 "	5,186 "
Scrap-iron	1,384 "	2,809 "	3,062 "
Scrap-steel	456 "	456 "	306 "
New iron rail	6,642 "	6,821 "	6,225 "
New steel rails	4,816 "	5,213 "	4,698 "
Grand total	29,263 tons.	33,864 tons.	32,133 tons.

Decrease during March, 1883.....1,731 tons.

American Pig.—The dullness of the past months has developed into complete stagnation, and we do not hear of a single transaction of any thing above a jobbing character, and furnace-men are apparently not even accorded the poor consolation of an occasional inquiry. The makers of standard brands appear to hold firmly to their prices; but unless a reaction sets in, some of them will be forced to move some of the accumulating stocks at lower figures. Outside brands are offered at greater concessions. We quote for American Foundry, No. 1, at tidewater, $22.50@$24, nominally, for ordinary to choice; $21@$22 for No. 2; $18.50@$19.50 for Gray Forge; and $16@$17 for White and Mottled. In Bessemer pig, we hear of no transactions, $22 being asked for American. Spiegeleisen is unchanged at former quotations, $32 for 20 per cent, and $26 for 12 to 15 per cent.

Scotch Pig.—Practically nothing has been done The arrivals are light—600 tons—but only part of them have gone into consumers' hands, which is a discouraging symptom. Freights from Glasgow are 5 shillings. We quote nominally, Coltness and Langloan, $24@$24.50; Glengarnock, $22@$22.50; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cables were received to-day: Carnbroe, 55s. 3d.; Gartsherrie and Summerlee, 61s. 3d; Coltness, 63s.; Langloan, 64s.; Glengarnock, 54s. 9d.; and Eglinton 48s. 6d. Warrants are 47s. 1d., a little higher.

Rails.—During the week, sales aggregating about 30,000 tons have been made in one large lot and several small lots, at prices varying from $38@$39 at mill, which we quote. 20,000 tons having been taken by one Pennsylvania mill at the lowest figures stated. England is lower. The statistics of track laid during the first three months of the current year, as compiled by the *Railway Age*, are not encouraging to this interest, though the severe winter told against active work in some of the sections where the additions to the mileage are heaviest. The total for the first three months of 1882 is only 766 miles, against 1200 miles during the corresponding period of 1881.

Old Rails.—Business is restricted, spot lots of Ts ranging from $24@24.50, while for future delivery the quotations are lower. Double Heads are scarce.

Scraps.—We have no business of magnitude to report, the market being dull and lifeless at $25 for No. 1 asked, ex ship.

Philadelphia. April 13

The fact is becoming more widely recognized that the producing capacity is so much larger than the consuming capacity that a further decline in iron and steel is only a question of time, and that restriction in some form or other, voluntary or through strikes, will become a necessity. Iron-making capacity has been restricted from 10 to 15 per cent, according to some estimates, and a further restriction is thought probable unless some relief is obtained through an increasing demand.

Pig-Iron.—The market is not weaker than usual; in fact, the transactions during the past week indicate that the consumers of forge iron especially have a good deal of confidence in the future of trade, because they have been purchasing with a good deal of freedom, and for deliveries from sixty to ninety days distant in a few cases. Inferior irons are sold at a sacrifice in some cases, and only the very best of the standard irons command any thing like full prices. Two or three are held near $21, but the most irons are selling in the neighborhood of $19, and some from 50 cents to $1 less. Concessions are readily extended, and buyers have been covering future requirements for from thirty to sixty days. Foundry irons are selling almost altogether in small lots, those of 100 tons being exceptional transactions. To-day's quotations run from $23.50@$24.50 for No. 1, and $21.50@$22.50 for No. 2. There is less inquiry, and buyers are not disposed as a rule to go beyond their immediate requirements.

Foreign Irons.—English is to be had between $20 and $21, and retail lots of Scotch have been going all

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.										SALES.
	April 7.		April 9.		April 10.		April 11.		April 12.		April 13		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.			2.80		2.85	2.80	2.75				3.00		700
Amie Con., Co.	.23	.22	.23	.22	.24	.21	.21	.20	.20		.20		24,900
Argenta, Ne.									.85				100
Bar. & Walker, Ut.													
Bassick, Co.			9.75										100
Belle Isle, Ne.													
Bodie Cons., Ca.	1.45	1.40	.95		.85		1.65		1.45	1.40			521
Breece, Co.													
Bulwer, Ca.													
California, Ne.	.20				.21				.22		.21		2,285
Cal. & Hecla, Mich.													
Carbonate Hill	1.10	1.00											1,200
Caribou Con., Co.													
Chrysolite, Co.	1.20	1.15			1.20		1.20		1.20	1.15	1.20	1.15	2,275
Cons. Va., Ne.	.51	.50			.51		.48		.49		.46		3,800
Crown Point					1.05		1.05						250
Deadwood-Terra, Dk.													
Dunkin, Co.					.23				.25				200
Eureka Cons., Ne.	6.00				6.00		5.50		4.50		5.75		285
Excelsior, Ca.													
Father de Smet, Dk.			4.50				4.50						200
Findley, Ga.													
Gold Stripe, Ca.	.05		.05										1,100
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.													
Green Mountain, Ca.					.83	.82					.80		800
Hale & Norcross, Ne.													
Hall-Anderson, N. S.	1.70	1.50	1.80		1.85	1.70	1.65	1.55	1.75	1.70	1.85	1.75	6,100
Hibernia, Co.					.03								100
Homestake, Dk.	15.50		15.50		15.50				15.00				600
Horn-Silver, Ut.			7.88						8.00	7.75			155
Hukill, Co.							.13	.10					1,900
Independence, Ne.	.65				.65		.65						400
Iron Silver, Co.	2.90				2.90		2.90	2.80	2.95	2.85	2.85		1,940
La Plata, Co.													
Leadville C., Co.	.68				.68		.64		.70	.64			468
Little Chief, Co.	.41		.48	.42			.46	.42			.45		3,000
Little Pittsburg, Co.	.60										.65	.60	1,400
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	3.25		3.25		3.25				3.40				700
Northern Belle, Ne.					9.00				9.50				30
North Belle Isle, Ne.											.35	.30	700
Ontario, Ut.	27.00				26.50								300
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.					44.50	44.00							300
" Com., Ca.													
Rising Sun, Ca.									.03				100
Robinson Cons., Co.	.79	.69	.87	.80	.83	.80	.80	.77	.83	.76	.88	.82	74,800
Savage, Ne.							2.25						50
Sierra Grande, N. M.	1.85		1.85	1.75	1.80		1.90		1.95	1.90	1.90	1.75	5,400
Sierra Nevada, Ne.							2.25		2.30				110
Silver King, Ar.			10.50		10.60		10.00						325
Spring Valley, Ca.	1.50				1.85		1.75						250
Standard, Ca.	6.50		6.75		7.00						7.00		1,305
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket	3.15												225

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.										SALES.
	April 7.		April 9.		April 10.		April 11.		April 12.		April 13		
	H	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance											.16	.15	.18	.17	1,500
Albion, s. L.															
Alta-montana, G.	.08		.08		.08				.08		.08		.08		4,500
Am. Flag, s.															
Barcelona, G.	.13		.13	.12			13		.12						4,800
Bear Creek															
Bechtel Con., G.															
Best & Belcher, G. S.											3 75				20
Big Pittsburg, S. L.							.17		.16				.15		1,600
Bradshaw, S.	.28		.30										.28		1,700
Buckeye															
" pref.															
Bull-Domingo, S. L.	.07		.07												400
Bye and Bye															
Calaveras, G.															
C'lav'r's W. & M. Co.															
Cal., B. H., G.															
Carbonate Hill, S. L.															
Catskill															
Central Ariz'na, S.	.30						.30								300
Chapparal															
Cherokee, G.			.02		.02										900
Climax, Co.	.06														2,100
Cons. Imp'ri'l, G. S.	.06														200
Con. Pacific, G.															
Crowell, G.	.04				.04						.04				5,100
Dahlonega, G.											.02				2,600
Decatur	.05		.05	.04	.06	.05	.06	.05	.06	.05	.05	.04			12,800
Durango, G.	.06	.05													1,200
Eastern Oregon			.50								.60		.60		500
Elko Cons.	.09		.09	.08	.09	.07	.08	.07	.07	.06	.06	.05			36,400
Enterprise	.29	.28													5,000
Fannie Barret											2.20				200
Gold Placer, G.															
Goodshaw, G.															
Granville, G.															
Hariem M. & M. Co.	1.45		1.50	1.45	1.50	1.45	1.45		1.50		1.45				3,500
Hortense, S.			.12												400
Lacrosse, G.	.14		.14				.13		.12		.13	.11			10,500
Mariposa Pref., G.															
" Com., G.															
Mexican, G. S.	3.25	3.19					3.00	2 88							650
Miner Boy					.02										100
Mono															
North Standard, G.															
N. Horn-Silv'r, S. L.															
Ori'nt'l & Miller, S.	.18		.18	.17	.17		.17		.18	.17	.17	.16			3,900
Quartz Creek	.02	.01	.02	.01	.02		.02		.02		.03	.02			12,700
Rappahannock, G.															
Red Elephant, S.			.07						.07						800
Ruby, of Arizona															
Silver Cliff, S.							35				35				200
Sonora Con.	.90	.37	.62	.46	.65	.45	1.00	.64	1.10	.98	1.45	1.05			69,4 0
South Bodie, G.															
South Bulwer, G.															
South Rite															
South Pacific	.05						.05		.06				.05		2,700
State Line, 1 & 4, S.	.12		.02		.02										5,6 0
" Nos. 2 & 3, S.	.06		.06		.05		.06		.06						3,100
Sutro Tunnel			.21	.20	.21		.21		.21	.20	.21				5,7 0
Taylor-Plumas	.17		.17		.15				.14	.13	.14				6,400
Unadilla, S.	.04	.03													1,400
Union Cons., G. S.									3.75						50
Vandewater															
Washington															

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 139,384. Non-dividend shares sold, 204,710.

BOSTON MINING STOCKS.

	April 6.		April 7.		April 9.		April 10.		April 11.		April 12.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez							2.25	2.00			2.13	2.00	450
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.	2.13						2.00						250
Bowman Sil			.12	.10	.12	.11	.11	.10	.12	.09	.11	.09	12,700
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec	240		239½		239½		240	239½	240		240	239½	73
Carbon. Hill													
Catalpa			.55	.50	.70	.55	.70	.65	.66	.60	.75	.65	20,475
Central Ariz													
Cherryfield													
Co. Virginia									.50				200
Copper F'lls											1.00		100
Copperop									.06				500
Crescent			.22		.22		.24	.22½			.25		1,000
Cumberl'd					.70								200
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin			.25				.26		.25		.25		1,650
Empire							.19	.16	.17				3,400
Eureka Con.													
Franklin					11.00		11.00		10.50		11.00		615
Hancock G.													
Harshaw													
Homestake													
Huron	.75	.50	.75				.87½	.75	.62½		.50		1,155
Indian Q'n.											1.31¼		100
Little Pitts.													
Mahmoth			.55										1,000
Mass. & N.M.					.08		.08		.09	.08	.09	.08	9,950
Milton													
Napa													
National	.75		.87½										350
Ontario					27.00								10
Osceola	27.00	26.50	27.00	26.50	27.00		26.50		26.50				296
Penn-Breck													
Pewabic											5.00	4.00	60
Pine Tree													
Plymouth							.20						200
Quincy	49.00		48.50	48.00	47.75		48.00	47.50	47.25	47.00	47.50	46.00	454
Ridge													
Robinson													
San Pedro	.60		.60				.57½		.57½		.60	.55	1,850
S'ra Nevada													
S'ra Grande													
Silver Isle	3.00		3.00						3.00				215
Silver King											10.00		50
Simpson Gd													
So. Pacific													
Standard													
State Line, Nos. 2 & 3													
Sullivan							.87½						100
Sutro Tun							.21				.21		700
Sycamore													
Twin Lead			.10		.13	.12			.14		.15		9,500
Vizina													

PHILADELPHIA MINING STOCKS.

	April 6.		April 7.		April 9.		April 10.		April 11.		April 12		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American													
Argent	.19		.18		.18		.17		.17		.17		13,100
Arizona So.													
Aztec													
Battle Mt.							.04		.04				2,000
Black Sul.													
Bodie													
Buena	.03		.03		.03		.03		.02				12,175
California													
Calista													
Cincinnati	.10	.09	.10				.11		.09				7,900
Comprom'e.	.30		.30		.30		.30		.30		.27½		11,900
Contention			4.25										100
Dauntless													
Del Monte													
Denver City											.13		4,100
Fairview													
Eureka													
Girard	.11		.10	.09	.10		.10		.11	.10			12,300
Golconda													
Golden Age													
Governor	.08	.07	.08		.07		.08	.07	.08				15,500
Grand Un'n	.18		.20		.22	.20	.23	.20	.23		.23		28,600
Gunnison											.57½	.50	2,800
Hancock													
Iowa Gulch	.08		.07		.07		.07		.08	.07	.07		38,900
King Bul'on													
Ledger Con.					.01								3,500
Little Dia'd.													
Little Maud	.05		.05										6,3 0
L'g & D'y Hl													
McCullough													
Magnolia													
Montana													
Mt. Lincoln					.01								1,000
Mt. Sheridan			.06		.05				.05				17,400
National			.01		.01		.01		.02				25,300
Orlon	.06				.05	.04	.06	.05	.06		.05	.01	13,700
Orion Pref.													
Palmetto E.													
Pembina					.17	.16	.16		.16		.15		5,700
Penn-Breck	.10		.11		.11		.12		.11		.12	.11	8,800
Permanent	.02		.02				.03						6,800
Pizarro													
Pizarro Ex.									.01				1,500
Potosi													
Rara Avis			.35										100
Rara Avis E.			.09	.08	.08		.09		.09		.09		9,200
Record													
Rico Pion'r.													
San Pedro													
Sierra G'nde	1.90		1.90	1.87½	1.82½	1.75	1.80	1.77½	1.90		2.00	1.85	23,615
Silver Cord	1.55		1.60										2,100
Silv'r Plume													
Silver Rock													
Sovereign													
Standard													
Sultana	.04						.04		.04		.04		5,300
Sutro Tun'l.							.20						500
Tombstone	.80	.77½	.77½	.75	.75		.77½		.77½		.80		7,325
Tranquilli'y													
Victor											.02	.01	21,500
Yale Mt.					.05		.06		.06		.07		2,000

the week at prices from $20@$25. The founders can not be induced to take hold in large lots, as they expect to buy domestic irons at more favorable rates. Bessemer iron can be sold at $21@$21.50. The selling prices are one dollar above this. Buyers are holding off.

Charcoal Blooms are firm at $64@$65 for the best makes, and $60@62 for some inferior products. Anthracite Blooms have sold between the limits of $53@$57, according to quality and size of order.

The Merchant Iron market is still sluggish. The store-keepers report a fair amount of business transacted, and 2·30c seems to be the best price obtained for small lots, but 2·25c. is not exceptional. Mill-owners generally agree that the demand is not active, and that it is a difficult matter to maintain prices at remunerative limits. Refined Bar has been booked at 2·20c. and from that down to 2c. for large lots. Consumers are purchasing for immediate requirements, and consider that the outlook is favorable to still lower prices, although manufacturers say that present rates are the lowest possible. Nothing but a further decline in pig-iron will weaken Merchant Bar below 2@2·20c., and furnace-men would rather blow out than quote lower than the figures given. A number of furnaces are now idle. Skelp Iron is under fair inquiry for summer and fall delivery between 2·10@2·40c.

Sheet-Iron is active in small lots at 3¼@4¼c. for light and heavy sheets, according to gauge, and large shipments of galvanized iron have just been made on old orders at 35 per cent off. Prices are weak, and for large orders there is an active competition among makers. Considerable improvement is noted in Common and Refined plate for building purposes; but prices are lower than usual. Common Plate is quoted at 2·40c.; Shell-Iron at 3¼@3·40c.; and Flange Iron, all the way from 4@4·40c.; Fire-Box, 5@5¼c. There is an active competition for business in Plate-Iron.

Structural Iron.—Bridge Iron has been inquired for in large lots, and orders have been booked at low figures. Quotations are given at 2½c. for Angles; 3@3¼c. for Tees; and 3¼@3½c. for Channels and Beams. The manufacturers have a large amount of business in sight; but the active competition for it is likely to depress selling prices a little lower than quoted now.

As to labor troubles, it is too soon to say very much. The Amalgamated Association has not yet named its committee to confer with the manufacturers' committee; but from the tone of expressions made at the meetings of the respective parties, it is thought that an amicable adjustment will be effected, though it must be on the basis of a further decline in wages.

Steel is moving in larger lots this week, because consumers have been holding off for a good many weeks for lower prices. The concessions have been made, and requirements for a month or two are filling.

Steel Rails are in active demand at $39, with concessions for larger lots, and the volume of business placed is sufficient to prevent any further competition.

Old Rails.—Movements in old rails are exceedingly dull, and a few lots have been sold at $25 for Tees. Offers are made by sellers at $28 for Double-Heads, but no buyers have come around. Negotiations are in hand for summer shipment at a dollar per ton off.

Scrap-Iron has sold in large lots at $25 for No. 2, and $26@$27 for No. 1, and business is done in cargo lots for shipment at $25.

The general tone of the market is less encouraging than some time ago; but the consumption is still large, and the only obstacle in the way of a heavy demand is as to bottom prices. With more iron making than there is an apparent demand for, the tendency is toweakness; and buyers, instead of anticipating requirements as they do on a rising market, wait for sellers to move, and hence give prices a downward tendency.

Cleveland. April 12.

We note for the past week a fair trade in pig-iron and as a rule at firm prices. Consumers are not yet agreed that the uncertainty as to the course of the market is over, and in consequence are not willing to buy far ahead. On the other side, furnaces do not wish to make contracts for future delivery at ruling figures, as they see little or no profit at present cost of manufacture. The developments of the next two or three weeks as to the labor scale on finished iron will determine the course of many managers about purchases of ore, etc. Until that cause of distrust is removed, it is not probable that any great activity either in ores or pig-iron will be seen.

We quote as before.

COAL TRADE REVIEW.

New York, Friday Evening, April 13.

Anthracite.

The market is considerably duller than it has been, and while the companies, so far as known, are firmly adhering to their prices in this market, there is considerable pressure to sell on the part of individual operators, and middlemen, in their anxiety to retain trade, are cuting down their commissions, occasionally entirely giving them up to buyers, who are thus encouraged in their policy of holding off.

All the companies are stocking coal more or less, but not by any means to an extent that would make them anxious to reduce their stocks. The Eastern market is still in an unsatisfactory condition, while the Western trade will not begin for some time to come. The coal movement from Buffalo by lake is not likely to be open for several weeks, while last year lake navigation opened on the 26th of March. The stock of anthracite ready for shipment on the docks does not exceed 150,000 tons.

Bituminous.

According to all indications, matters in the bituminous coal trade are rapidly approaching a crisis, and the happenings of the next week or two will probably decide whether or not the hopes of consumers that concessions will be possible are well founded. The hesitation shown in delaying the award of a number of some of the largest contracts for which bids were opened during the past two weeks is attributed to efforts made by the parties using the coal to engineer a break in the railroad rates. The statements which are brought forward to convince each one of the two vast roads which has entered into the agreement, that the other has not adhered to its provisions, are calcuted to put a severe strain upon the compact. On the one hand, Cumberland coal appears to have been sold at low figures in the Eastern market, a fact which, it is urged, can not be entirely explained away by pointing to the lower rates at which this coal can be put down at Georgetown via canal. On the other hand, large contracts have been made by Clearfield operators, one of 15,000 tons within the last ten days, at a figure alongside in this harbor, which would leave a direct loss of 20 cents per ton, estimating the cost of delivering the coal into cars at the mine at 75 cents.

These are some of the considerations that enter into this knotty problem. Its solution, whether by violent or other means, is, we believe, near at hand. Should it lead to a break, the bituminous operators will be afforded an opportunity to largely widen their market, particularly in the East.

During the week, a number of smaller contracts have been closed. Current business, however, is slack and prices are low. We quote nominally, $4.35@$4.50for Clearfield, and $4.40@$4.60 for Cumberland, according to quality.

The Horsford Almanac and Cook Book

mailed free on application to the Rumford Chemical Works, Providence, R. I.

PATENTS.

SECURED and **SOLD** in all countries. Partners procured, Joint Stock Companies organized. 53 page "Inventor's Handbook" free, giving patent laws of all countries and full information how to procure, sell, develope or secure capital on patents. **E. L. RICHARDS & CO. 814 B'way, N.Y.**

ASSAYERS' SUPPLIES.

(Established 1848.

Balances and Weights, Furnaces, Scorifiers, Cupels, Crucibles, Tongs, etc.

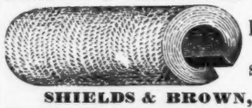
A LARGE STOCK. Also

CHEMICAL APPARATUS OF ALL KINDS.

Trial orders solicited. E. B. BENJAMIN,

6 Barclay and 12 Vesey Sts., New York.

BRADLEY'S INSULATED AIR COVERING,



FOR HOT AIR, GAS, WATER AND STEAM PIPES.

Send for Illustrated Circular.

SHIELDS & BROWN, Successors to Bradley Mfg. Co., Lake & Canal Sts., Chicago

FINE WOOD PHOTO-ENGRAVING

SEND COPY FOR ESTIMATE. IT WILL PAY YOU

CROSSCUP & WEST.

702 CHESTNUT ST. PHILADA PA.

Send stamp for circular.

H. K. PORTER & CO.,

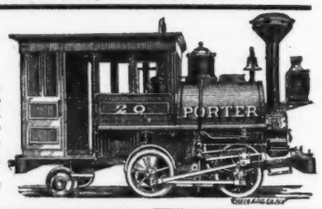
BUILDERS OF

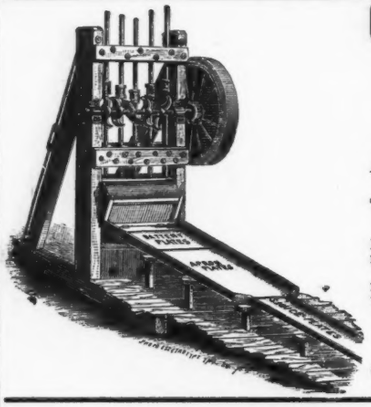
LIGHT LOCOMOTIVES,

PITTSBURG, - - - - PA.

On application, catalogue will be mailed giving description and power of over 80 sizes and styles of locomotives adapted to all varieties of service, including outside and underground work at Mines, Narrow-Gauge or Wide-Gauge Railroads, Logging Railroads with wood or iron rails, Street-Car Railways, Contractors' Works, Plantations, Shifting at Furnaces, Mills, etc.

All work steel fitted and built to interchangeable system, and duplicate parts always kept on hand.





Gold Quartz & Placer Miners'

SILVER PLATED

AMALGAMATING PLATES,

FOR SAVING GOLD.

Every description of plates for QUARTZ MILLS and PLACER AMALGAMATOR MACHINES made to order, corrugated or plain.

OVER 2000 ORDERS FILLED.

The most extensive and successful manufacturer of these plates in the United States.

Will fill orders for delivery in Dakota, Montana, Colorado, New Mexico, Central and South America, at lower prices than any other manufacturer.

EASTERN MANUFACTURERS OF MINING MACHINERY will find it to their advantage to get my prices before purchasing elsewhere.

SEND FOR PRICE-LIST.

San Francisco Plating Works,

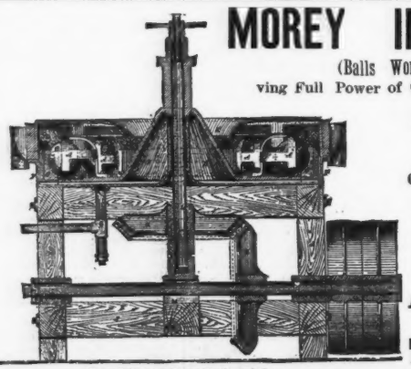
653 & 655 MISSION ST., SAN FRANCISCO, CALIFORNIA.

E. G. DENNISTON, Proprietor.

MOREY IMPROVED PULVERIZER.

(Balls Working Horizontally instead of Perpendicularly.)

ving Full Power of Centrifugal Force in the Simplest Manner Possible.



Efficient, Durable, and Light.

REQUIRES LITTLE POWER.

Gold and Silver Grinding, Concentrating, and Amalgamating Machinery, Engines, and Boilers of any size. Hydraulic Giants and Pipe. Rock Breakers, Stamp-Mills, Improved Riffles, Silver-Plated Copper, Hoisting and Pumping Machinery, Hand-Power Two-Stamp Mills, Steel Shoes and Dies for Stamp-Mills, and Mining and Mill Supplies.

Agents for Imlay Concentrator and Miners' Hand Rock Drill.

The Morey & Sperry Mining Machinery Co.,

Successors to MOREY & SPERRY,

For Wet or Dry Pulverizing.

WAREROOMS: 92 & 94 LIBERTY ST., NEW YORK. Foundry and Machine Shop: Newburg, N.Y

☞ SEND FOR NEW ILLUSTRATED CATALOGUE. ☜